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Report on
Salinity Investigation and Salinity Management Plan

Proposed Rezoning
Sub Precinct 5, South Creek West, NSW

Prepared for
Boyuan Bringelly Pty Ltd

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1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by Boyuan Bringelly Pty Ltd to carry out a Salinity Investigation and prepare a Salinity Management Plan (SMP) for an area within Sub Precinct 5, South Creek West, NSW located at 670 The Northern Road, Cobbitty (hereinafter known as 'the site'). The site is shown on Drawing 1, Appendix A and covers an approximate area of 169 ha. The investigation was undertaken in accordance with DP's proposal reference 92225.05.P.001, dated 10 October 2022.

Saline soils affect much of the Western Sydney Region. Buildings and infrastructure located on shales of the Wianamatta Group are particularly at risk. Salinity can affect urban structures in a number of ways, including corrosion of concrete, break-down of bricks and mortar, corrosion of steel (including reinforcement), break-up of roads, attach on buried infrastructure, reduced ability to grow vegetation and increased erosion potential.

It is understood that a residential subdivision is proposed and that an assessment of soil salinity is required for submission to Camden Council with the subdivision application and to assist in conceptual planning of the development.

A preliminary geotechnical and salinity investigation was previously completed by DP for the site in 2020 (refer Section 5). Due to site access at the time of the investigation, intrusive sampling was not completed within Lot 500 in Deposited Plan 1231858. As such, this investigation comprised excavation of test pits within Lot 500 in Deposited Plan 1231858, followed by laboratory testing of selected samples, review and collate previous salinity results available for the site, engineering analysis and reporting. Details of the work undertaken and the results obtained are given within this report, together with comments relating to design and construction practice.

This assessment was undertaken concurrently with a geotechnical investigation which is reported separately (Project 92225.06.R.002.Rev0).

2. Scope of Work

The following scope of work was undertaken for this SMP:

- Review of results of DP(2022);
- Using a backhoe, ten test pits were excavated at the site to a minimum depth of 3 m bgl or prior refusal;
- Soil samples for salinity and related testing were collected generally at depths of 0.5 m and thence 0.5 m intervals to the maximum depth of the above pits;
- Classification of selected soil samples for soil texture, field moisture content, electrical conductivity (EC 1:5), pH, chloride, and sulphate, sodicity and Emerson crumb dispersibility tests at a NATA accredited analytical laboratory; and
- Preparation of a Salinity Investigation and Salinity Management Plan Report (SMP) discussing the methodology and findings of the investigation, and recommended management strategies.

3. Site Description

The site, incorporating Lots 2 and 4 in DP1216380, Lot 4 in DP1273487, and Lot 500 in DP1231858, is an irregular, roughly 'L'-shaped site, with maximum plan dimensions 1.27 km long (approximately parallel to The Northern Road) by 1.77 km wide (approximately east-west), and a combined area of about 169 hectares. The street address for the northern limit of the site is currently 670 The Northern Road, Cobbitty. The site is bounded to the north, south and west by rural residential and agricultural land, to the south east by a newly constructed residential development and to the east by The Northern Road followed by a newly constructed residential development.

The site boundary is shown on Figure 1.

Figure 1: Site Location

Overall, the site generally slopes down towards the north, with elevations ranging between RL120 m-RL145 m along the southern site boundary (falling towards the west), RL96 m-RL120 m along the eastern site boundary (falling from south to north), and to about RL84 m near the northern limit of the site (i.e. the lowest point along the northern boundary of Lot 2 in DP1216380). Hillside slopes are present within each of the lots, although the slopes within Lot 2 in DP1216380 are generally shallow and relatively rounded.

At the time of the field work for the assessment, the site was mostly covered with grass and a scattering of tall trees, although sloping areas of the site were covered with tall and/or dense vegetation (including olive trees). Several dams are scattered across the site, being generally clustered in the north-eastern quadrant of Lot 500, and the eastern and western portions of Lot 4 in DP1216380 and Lot 4 in DP1273487. A location plan showing the positions of the current and previous test pits are shown on Drawing 1, attached.

4. Environmental Setting

4.1 Topography

The topography across most of the site is gently undulating, and appears to be controlled by an irregular ridge line which is present within the southern portion of the site. A series of incised gullies have formed, creating an ephemeral dendritic drainage system that flows into the farm dams.

As previously noted, site elevations fall from a topographical high-point of about RL145 m (relative to the Australian Height Datum (AHD)) adjacent to the south-eastern ridgeline and southern site boundary of Lot 4 in DP1273487, to a topographical low-point of approximately RL84 m adjacent to the northern boundary of Lot 2 in DP1216380. The ridgeline comprises steep upper slopes up to 30 degrees, with lower slopes of up to about 15 degrees. Most of the site's undulating terrain comprises slopes ranging between 0 – 10 degrees.

Construction of an access road and retaining walls was in progress along the south-eastern ridgeline, within two Lots adjoining Lot 4 in DP1273487 (including Lots 1-2 in DP1273487). It is understood that this work is part of a water storage reservoir project by Sydney Water.

4.2 Soil Landscape

Reference to the Penrith 1:100 000 Soils Landscape Sheet (Bannerman & Hazelton, 2011) indicates that the following soil landscapes are present at the site (also refer to Figure 2 on the following page):

- Luddenham erosional landscape (mapping unit 'lu'): associated with the steeper areas of the site, including the Lots subject to slope instability;
- Blacktown residual landscape (mapping unit 'bt'): generally associated with the flatter areas of the site; and
- South Creek alluvial landscape (mapping unit sc): associated with a small sub-area of the site near the northern site boundary.

The Luddenham erosional soil landscape is characterised by undulating to rolling low hills on Wianamatta Group shales, with slopes usually 5 - 20% and local relief of 50 - 80 m. Soils within this landscape are typically described as moderately reactive with a high erosion hazard. On crests and upper slopes (which is consistent with the observed topographic features within the southern and western portions of this site), these soils are typically described as dark brown or red podzolic soils, shallow to moderately deep (<1.0 m thick). On lower slopes and within drainage lines, these soils are typically described as yellow podzolic soils, moderately deep (<1.5 m thick).

The Blacktown residual soil landscape is characterised by gently undulating rises on Wianamatta Group shales, with slopes usually <5% and local relief to 30 m. Soils within this landscape are typically described as moderately reactive with low fertility, poor soil drainage and highly plastic subsoil. On crests, upper slopes and well drained areas, these soils are typically described as red and brown, shallow to moderately deep podzolic soils (<1.0 m thick). Elsewhere, on lower slopes and in areas of poor drainage, these soils are typically described as yellow, deep podzolic soils and soloths (1.5 - 3.0 m thick.

The South Creek alluvial soil landscape is characterised by floodplains, valley flats and drainage depressions within channels across the Cumberland Plain, and are usually relatively flat with incised

channels. Soils are often very deep and layered, overlying bedrock or relict residual soils (red and yellow podzolic soils). Soils within this landscape are typically described as being subject to erosion (hazard) and frequent flooding.

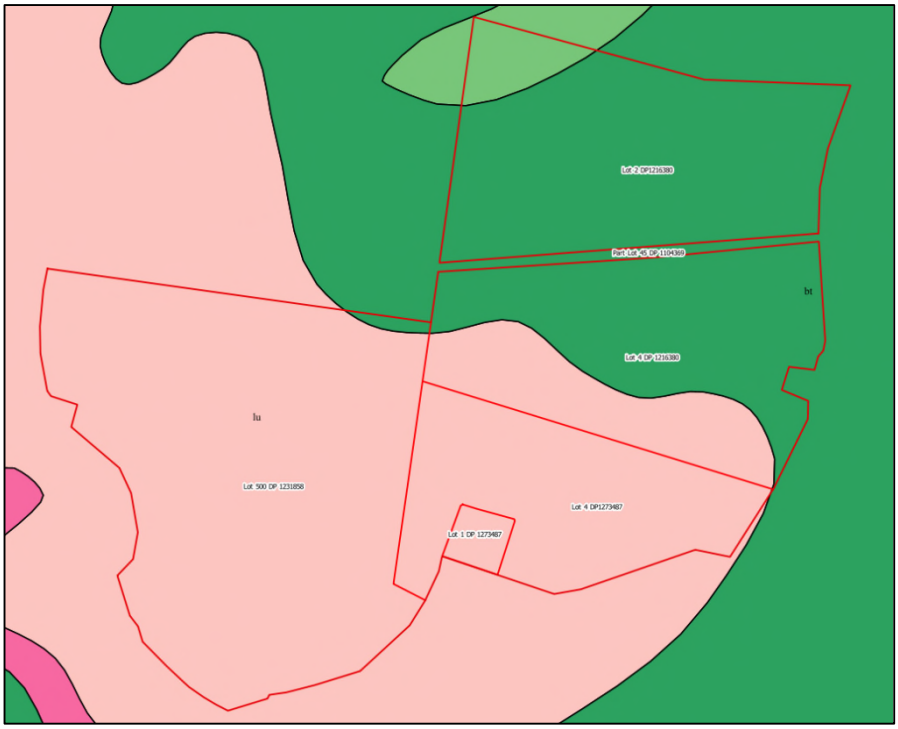

Figure 2: Penrith 1:100 000 Soils Landscape Sheet, for the revised ILP footprint.

4.3 Geology

Reference to the Penrith 1:100 000 Geological Sheet (Herbert & Smith, 1991) indicates that the site is underlain by both Bringelly Shale (mapping unit 'Rwb') of the Wianamatta Group of Triassic age, and Fluvial Sediments (mapping unit 'Qal') of Quaternary age. The Bringelly Shale formation typically comprises shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff, whereas fluvial sediments typically comprise fine-grained sand, silt and clay. Un-named sandstone members within the Bringelly Shale are present within the southern parts of the site, forming elongated ridgelines.

The NSW Seamless geology dataset (Colquhoun, et al., 2019) indicates that a broad, north-west striking synclinal fold structure is present within the western part of the site, with another synclinal fold structure present about 5 km to the north-east. This data indicates that Lot 4 in DP1273487 is on the eastern limb of the syncline, that most of Lot 500 in DP1231858 is on the western limb of the syncline, and that an anticline (or a series of more than one smaller anticlines) is likely to be present within the eastern part of the site. Therefore, bedding within the rock on the western side of the ridgeline is likely to be dipping towards the south-west, and bedding within the rock on the eastern side of the ridgeline could be dipping towards the north-east.

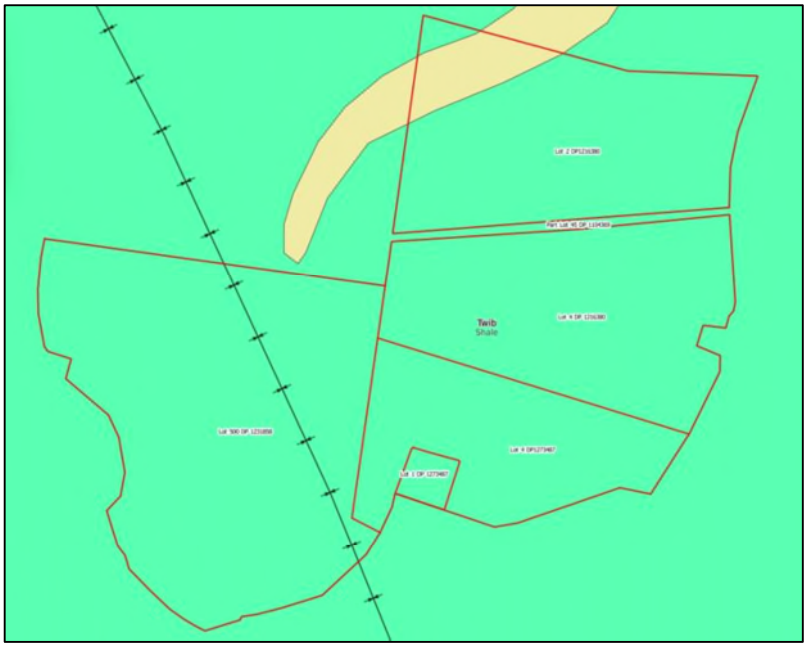

Figure 3: Penrith 1:100 000 Geological Sheet, for the revised ILP footprint.

4.4 Hydrogeology

Ephemeral water courses traverse through the site in a general northerly direction, with farm dams present at a few locations within the ephemeral watercourses. Surface water is anticipated to flow towards the north along these ephemeral watercourses, towards Lowes Creek (about 2 km to the north).

A search of the publicly available registered groundwater bore database indicated that registered groundwater bores are not present within 1 km of the site.

Based on the regional surface topography and the inferred flow direction of the watercourses, the anticipated flow direction of groundwater beneath the site is northward towards Lowes Creek.

Given the presence of Bringelly Shale, groundwater within the rock beneath the site is anticipated to be brackish to saline, with the rock mass permeability likely to be dominated by flow through fractures/defects within the rock, and resultant low yields in groundwater wells (typically < 1 L/s). Accordingly, it is considered there would be no significant potential beneficial uses for groundwater which could be extracted from the underlying rock.

4.5 Salinity

Reference to NSW Salinity Potential in Western Sydney mapping (2002) indicates that most of the site is mapped as moderate salinity potential (pale yellow), with portions of high salinity potential (pale orange). The south-eastern site border is adjacent to an area of known salinity (red).

Figure 4: Salinity potential based on regional mapping

4.6 Acid Sulphate Soils

Published acid sulphate soils risk mapping indicates that the site is classified as Cq (p4), extremely low probability occurrence.

5. Previous Investigation Findings – DP, 2022

A preliminary geotechnical and salinity investigation was previously undertaken by DP for the site. The results of the investigation were formalised in a report entitled *"Report on Preliminary Geotechnical and Salinity, Proposed Rezoning, Sub Precinct 5, South Creek West, NSW"* (Project 92225.02.R.001.Rev3 and dated 8 December 2022). Field work for this investigation was undertaken in 2020.

DP(2022) comprised site inspection, intrusive site investigation, laboratory testing of selected samples, engineering analysis and reporting. Fourteen test pits were excavated for DP(2022). It was noted that due to site access at the time of the investigation, intrusive sampling was not completed within Lot 500 in Deposited Plan 1231858. Soils were generally identified as non-saline to very saline, non-aggressive to concrete and non aggressive to moderately aggressive to buried steel. These test pits and their sample data have been utilised and included within this investigation.

6. Field Work Methods

The field work for this salinity investigation was undertaken on the 16 and 17 November 2022. The scope of the intrusive investigation comprised the excavation of 10 test pits TP314 to TP323 to a minimum depth of 3 m or prior refusal. A further 13 test pits (TP301 to 313) were excavated as part of the concurrent geotechnical investigation; however, these were not sampled for salinity investigation purposes.

In addition, 19 test pits were excavated as part of DP(2022) (TP101 to TP119) which have also been utilised for this assessment.

Samples were collected and tested at 0.5 m intervals at select profile pit locations (TP314, TP315, TP316, TP317, TP318, TP319, TP320, TP321, TP322, TP323) and samples were selected and tested (generally at 0.5, 1.5 and 2.5 m, unless prior refusal) from non-profile test pits (TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109, TP110, TP111, TP112, TP113, TP114, TP115, TP116, TP117, TP118, TP119).

Test pits 314 - 323 were excavated with a JCB 4CX 8t Backhoe with a 450 mm bucket and Test pits 101 - 119 were excavated with a John Deere 315SE backhoe, also with a 450mm bucket. The test pits were logged on site by a DP geo-environmental engineer and representative disturbed samples were collected to assist in strata identification and for laboratory testing.

The locations of the test pits are shown on Drawing 1, Appendix A. All field measurements and mapping for this project have been carried out using the Geodetic Datum of Australia 1994 (GDA94) and the Map Grid of Australia 1994 (MGA94), Zone 56. All reduced levels are given in relation to AHD and were extracted from publicly available Government 1 m Lidar data.

7. Results

7.1 Field Work Results

The subsurface conditions encountered or interpreted from the field investigation are shown on the test pit logs in Appendix D, together with selected photographs of the test pit sides and the recovered spoil. Test pit logs previously excavated by DP (outlined in Section 5) are also included in Appendix D. Notes defining classification methods and descriptive terms used for each phase of work are included in the relevant appendix.

A summary of the typical sequence of subsurface conditions encountered at the site is presented below:

Topsoil:	Generally comprising silty clay or clayey silt to depths of between 0.15 m and 0.4 m (present at all locations), low or medium plasticity, with organic content (rootlets), and with or without trace gravel.
Colluvium:	Silty clay or clayey silt to depths of between 0.2 m and 0.9 m (identified at test locations 303-305, and 308-309, typically dark brown or grey, low plasticity up to medium to high plasticity, typically firm or stiff consistency and with sub-angular to sub-rounded gravel.
Residual soil and extremely weathered shale:	Stiff to hard silty clay, grading with depth to gravelly clay (relict rock texture: extremely weathered shale). Red-brown, orange, brown or pale grey (generally grading to be more grey with increasing depth), grading into pale grey, grey-brown or red-brown extremely weathered rock (i.e. very stiff to hard or hard gravelly clay, with bands of very low strength shale or sandstone), to depths ranging between 0.4 m to greater than 3.3 m. Soil is medium or high plasticity, grading with increasing depth to low to medium plasticity.
Shale Bedrock:	Bedrock encountered within the current test pits was either shale with bands of clayey silt or silty clay, or sandstone, being typical of rocks within the Bringelly Shale formation. Where encountered, the weathered rock was present below depths of 0.4 m, and was generally initially of very low to low strength at the soil-rock interface (highly weathered, or highly to moderately weathered). Rock strength increased with increasing depth in most test pits, to medium strength, and some test pits refused on medium strength bedrock. For test locations where refusal to the backhoe was reached, the toothed backhoe bucket was able to penetrate into the weathered rock a further 0 - 2.6 m (typically 0.5 - 1.5 m).

Free groundwater was observed within two of the test pits on the day of site works (prior to backfilling), at test locations 317 and 319, which were positioned in the lower-lying areas of the valley, adjacent to the meandering creek. In both test pits the groundwater was observed as slow seepage inflow from the gravelly clay (extremely weathered shale), at depths in the range 2.5-2.6 m. The soil moisture content was assessed (in the field) as being greater than the plastic limit at these two test locations, whilst intervals of clay soil at or just below the soil's plastic limit were observed within the upper 0.5 - 1 m of most test pits.

It is noted that groundwater levels are potentially transient and may fluctuate over time in response to climatic variations or anthropogenic influences. A separate investigation of groundwater, including the installation of monitoring wells has been undertaken separately (refer to Project 92225.04.R.002.Rev0).

8. Laboratory Testing

The laboratory test results and assessments of aggressivity, salinity, sodicity and dispersibility are summarised in Table C1 in Appendix C. Aggressivity to concrete was determined using pH values and sulphate ion concentrations, and aggressivity to steel was determined using pH values, chloride ion concentrations and calculated resistivities. The salinity class was inferred from ECe values using the method of Richards (1954) and dispersion potentials were derived from Emerson Class Number Tests.

The detailed laboratory test reports and chain of custody documents are provided in Appendix E.

Table 2 below summarises the total test sample numbers and the range of test results obtained.

Table 2: Summary of Parameters Tested and Results Obtained

Parameter		Units	Samples	Minimum	Maximum
pH		pH units	110	4.5	8.4
Chlorides		(mg/kg)	30	<10	1300
Sulphates		(mg/kg)	30	<10	330
Aggressivity	to Concrete	[AS2159]	110	Non-Aggressive	Moderately Aggressive
	to Steel	[AS2159]	110	Non-Aggressive	Non-Aggressive
Exchangeable Sodium (Na)		(meq/100g)	25	0.7	8.3
CEC (cation exchange capacity)		(meq/100g)	20	8.5	27
Sodicity [Na/CEC]		(ESP%)	20	3.5	44.4
Sodicity Class		[after DLWC]	20	Non-sodic	Highly Sodic
EC1:5 [Lab.]		(mS/cm)	110	6	110
Resistivity		Ω.cm	110	284.4	74074.1
ECe [M x EC1:5] where M is textural factor		(dS/m)	110	0.1	24.6
Salinity Class		[after Richards 1954]	110	Non-Saline	Highly Saline

8.1 Aggressivity

Figure 5 below, presents variations of aggressivity with depth at each profile test pit location, based on pH profiles, and the corresponding aggressivity class ranges as per the Australian Standard AS 2159 (2009). Due to the clay/silt composition of the soils, all samples were classed as Condition B as defined by AS 2159.

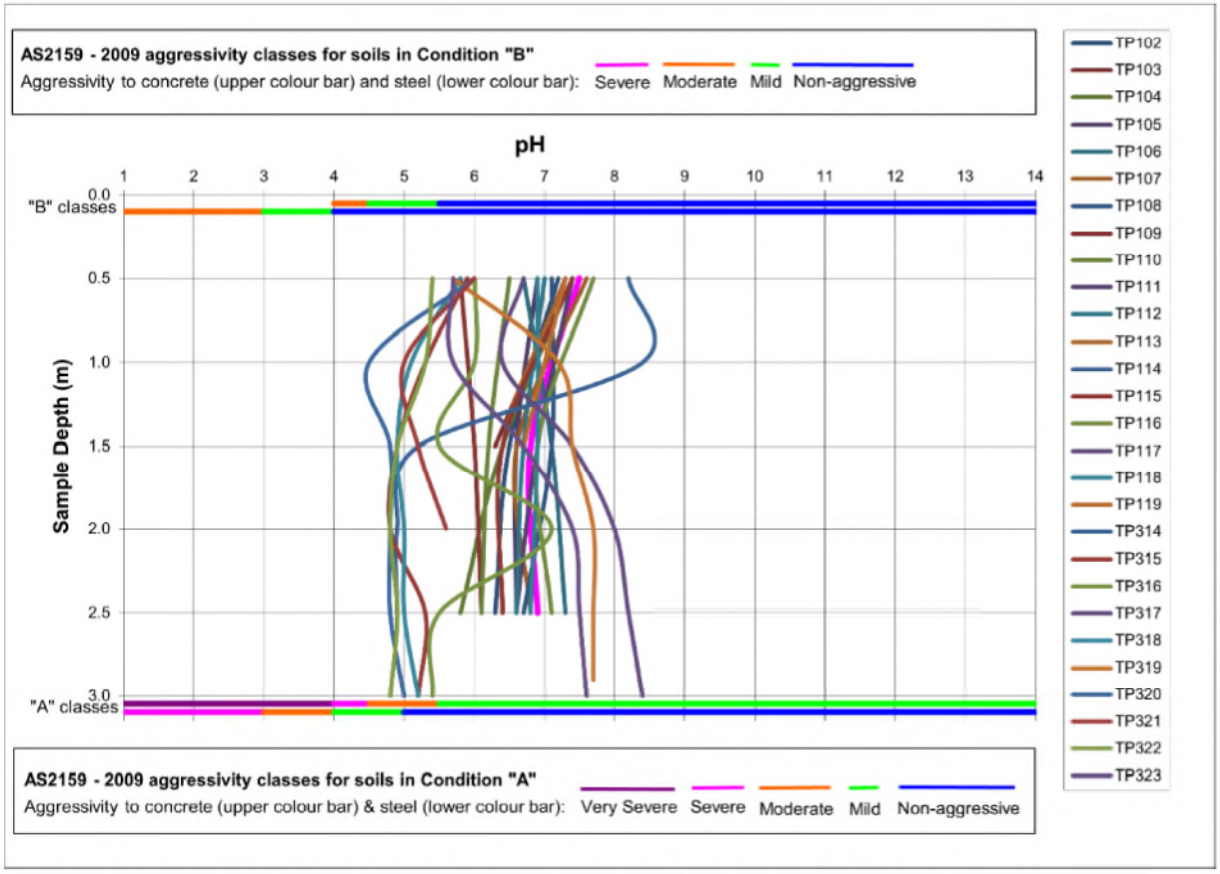

Figure 5. Vertical Soil pH Profiles and Aggressivity Classes at Profile Pit Locations

Figure 5 shows that the site was underlain by soils which are non-aggressive to moderately aggressive to concrete foundations and concrete piles based on pH values. The summary table (Appendix C) indicates that 74% of soil samples were non-aggressive to concrete and 26% were mildly aggressive. It is noted that one result (sample 320/1.0 recorded a pH result of 4.5 which is on the on the cross over between mildly aggressive (pH of 4.5 to 5.5) and moderately aggressive (pH of 4.0 to 4.5). As the results of samples collected both above (320/0.5) and below (320/1.5 to 320/3.0) were non-aggressive to mildly aggressive, sample 320/1.0 was classified as mildly aggressive.

The worst-case pH results for each test pit were used to define approximate areas of mild and moderate aggressivity to concrete foundations and piles within the site, as represented by colour zones on Drawing 2 (Appendix A).

The pH profiles of Figure 5 indicate that the materials throughout the site, at all investigated depths, are non-aggressive to steel. The chloride concentration guidelines of AS2159 support this non-aggressive classification. However, based on resistivity criteria (Appendix C), approximately 56% of soil samples were non-aggressive to steel, 42% mildly aggressive and 2% were moderately aggressive. Based on the results, the worst-case resistivity results for each test pit were used to define approximate areas of mild and moderate aggressivity to steel within the site, as represented by colour zones on Drawing 3 (Appendix A).

8.2 Salinity

Figure 6 below presents variations of salinity with depth at each profile test pit location, based on ECe profiles, and the corresponding salinity classifications of Richards (1954).

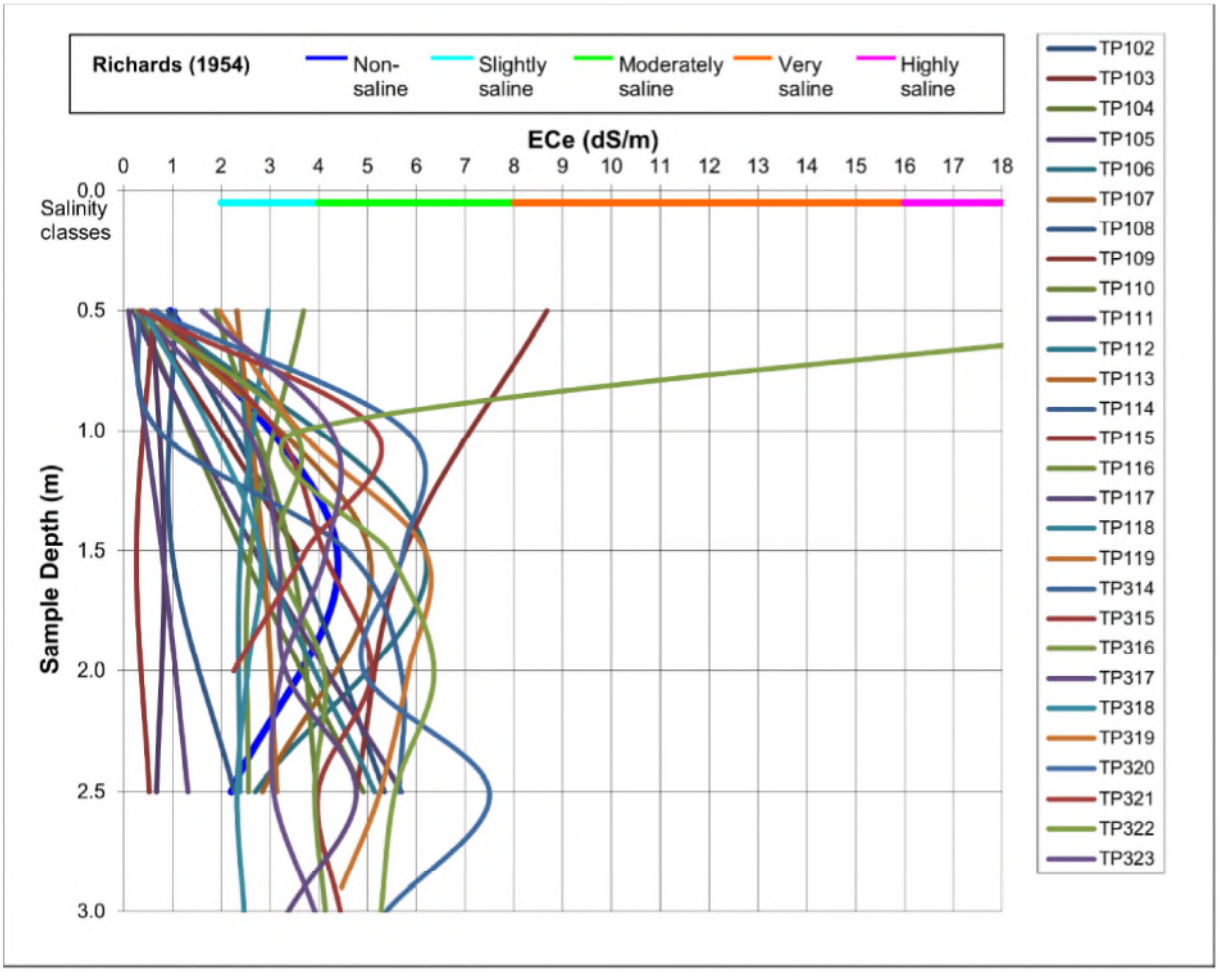

Figure 6: Vertical Soil Salinity Profiles and Salinity Classes at Profile Test Pit Locations

Table C1 (Appendix C) indicates that 29% of all samples were non-saline, 38% were slightly saline, 31% were moderately saline, 1% were very saline and 1% were highly saline.

Similarly, to soil aggressivity, maximum ECe values from each test pit were interpolated and contoured to define areas of slightly saline (ECe 2 – 4 dS/m), moderately saline (ECe 4 – 8 dS/m), very saline (ECe 8 – 16 ds/m) and highly saline (>16ds/m) to soil (see Drawing 4, Appendix A).

9. Impacts on the Proposed Development

The mild and moderate aggressivity to concrete and steel, the presence of moderately saline to highly saline soils and the highly sodic soils are naturally occurring features of the local landscape and are not considered significant impediments to the proposed development, provided appropriate management techniques are employed.

Salinity and aggressivity affects the durability of concrete and steel by causing premature breakdown of concrete and corrosion of steel. This has impacts on the longevity of structures in contact with these materials. As a result, management will be required (refer Section 10).

In addition, sodic to highly soils are present which have low permeability due to infilling of interstices with fine clay particles during the weathering process, restricting infiltration of surface water and potentially creating perched water tables, seepage in cut faces or ponding of water in flat open areas. In addition, sodic soils tend to erode when exposed. Management of sodic soils is therefore required to prevent these adverse effects.

10. Salinity Management Plan

10.1 Bulk Earthworks

The following management strategies are confined to the management of those factors with a potential to impact on the bulk earthworks aspects of the development.

A. Management should focus on capping of the upper surface of the sodic soils, both exposed by excavation and placed as filling, with a more permeable material to prevent ponding, to reduce capillary rise, to act as a drainage layer and to reduce the potential for erosion.

B. When possible, placement of excavated soils in fill areas with similar salinity characteristics (ie: to place excavated material on to in-situ soils with a similar or higher aggressivity or salinity classification). Alternatively, materials of higher salinity and/or aggressivity classification can be placed on to in-situ soils with a lower aggressivity or salinity classification, provided the placement location is tracked and the management protocols are upgraded for this area of the site to reflect the higher classification. Where this is not possible or not tracked, all fill areas will require to be treated as moderately aggressive to concrete, moderately aggressive to steel and highly saline.

C. With respect to any imported fill material required, testing should be undertaken prior to importation, to determine the salinity characteristics of the material, which should be non-aggressive and non-saline to slightly saline where possible, but in any case, not more aggressive or more saline than the adopted site classifications.

D. Sodic soils can also be managed by maintaining vegetation where possible and planting new salt tolerant species. The addition of organic matter, gypsum and lime can also be considered where appropriate. After gypsum addition, reduction of sodicity levels may require some time for sufficient infiltration and leaching of sodium into the subsoils, however capping of exposed sodic material should remain the primary management method. Topsoil added at the completion of bulk earthworks is, in effect, also adding organic matter which may help infiltration and leaching of sodium.

E. Avoiding water collecting in low lying areas, in depressions, or behind fill. This can lead to water logging of the soils, evaporative concentration of salts, and eventual breakdown in soil structure resulting in accelerated erosion.

F. Any pavements should be designed to be well drained of surface water. There should not be excessive concentrations of runoff or ponding that would lead to waterlogging of the pavement or additional recharge to the groundwater through any more permeable zones in the underlying filling material.

G. Surface drains should generally be provided along the top of batter slopes to reduce the potential for concentrated flows of water down slopes possibly causing scour.

H. Salt tolerant grasses and trees should be considered for landscaping, to reduce soil erosion as in Strategy A above and to maintain the existing evapo – transpiration and groundwater levels. Reference should be made to an experienced landscape planner or agronomist.

10.2 Civil Construction, Service Installation and Residential Construction

The following additional strategies are recommended for completion of service installation including but not limited to; roads, drainage and services. The following strategies are also anticipated to be required for construction of residential dwellings. A detailed salinity investigation will be required after completion of bulk earthworks in order to confirm the below strategies and provide more detailed recommendations for individual lots.

The below strategies should be complementary to standard good building practices, including cover to reinforcement within concrete and correct installation of a brick damp course (where used), so that it cannot be bridged to allow moisture to move into brick work and up the wall.

I. Based on the results of the intrusive investigation, soils that are non-aggressive to moderately aggressive to concrete and steel and non-saline to highly saline have been observed at the site. As such durability requirements provided in Tables 3 and 4 should be taken into account by the designer.

Table 3: Recommended Durability Requirements for Concrete Foundations and Structures

Site Salinity Classification (refer Drawing 4)	Site Soil Aggressivity to Concrete Classification (refer Drawing 2)	Recommended Durability Requirement (as per AS3600)		
		Minimum Concrete Strength (MPa)	Minimum Cover to Reinforcement (mm)	Minimum Cure Time (days)
Non-saline to Slightly Saline	Non-aggressive Soils	20	ND	3
	Mildly Aggressive Soils	25		
Moderately Saline	Non-aggressive Soils	25	45	3
	Mildly Aggressive Soils			
Very Saline	Non-aggressive Soils	32	50	7
	Mildly Aggressive Soils			
Highly Saline	Non-aggressive Soils	40	55	7
	Mildly Aggressive Soils			

Table 4: Recommended Durability Requirements for Concrete Piles

Concrete Aggressivity (refer Drawing 2)	Recommended Durability Requirement (as per AS2159)	
	Minimum Concrete Strength (MPa)	Minimum Cover to Reinforcement (mm)
Non Aggressive	32	45
Mildly aggressive	32	60

J. Wet cast concrete pipes and currently manufactured spun concrete pipes are understood to have estimated compressive strengths of 50 MPa and 60 – 70 MPa, respectively, in excess of the requirements for mass concrete in I above.

K. Reference to the test results of Table 1 (Section 8 of this report) and to Tables E1 and 3.1 of AS 4058 – 2007 "Precast concrete pipes" indicates that:

- the majority of the site falls within the AS 4058 Clay/Stagnant (low sulphate) soil type (chlorides ≤20 000 ppm, pH≥4.5 and sulphates ≤1000 ppm) and (in the absence of tidal water flow) falls within the AS 4058 Normal durability environment. Under these conditions, AS 4058 – compliant reinforced concrete pipes of general purpose Portland cement, with a minimum cover to reinforcement of 10 mm, are expected to have a design life in excess of 100 years. Any concrete pipes installed within the site should employ AS 4058 – compliant steel reinforced pipes of general purpose Portland cement, with minimum cover to reinforcement of 10 mm, or should be fibre reinforced.

- For areas mapped as moderately aggressive to concrete (refer Drawing 2, Appendix A), these areas fall marginally outside the AS 4058 Clay/Stagnant (low sulphate) soil type (chlorides <=20,000 ppm and sulphates <=1,000 ppm) and (in the absence of tidal water flow) falls within the AS 4058 "Other" durability environment. A review of the pH results within these areas of the site indicate a slightly more acidic environment than that within the Clay/Stagnant soil type definition (minimum pH 4.5) and reference to the Concrete Pipe Association of Australasia Engineering Guideline ("Designing Durable Concrete Pipelines") indicates an increase of cover to reinforcement (to 20 mm) or a protective (e.g. epoxy) coating or sleeve, or blended concrete, should be employed to maintain a design life in excess of 100 years. It is recommended that any concrete pipes installed within areas classified as moderately aggressive to concrete within the site should employ AS 4058-compliant steel reinforced pipes of general purpose Portland cement, with minimum cover to reinforcement of 20 mm, or with an alternative durability provision as indicated above, or should be fibre reinforced.

L. Resistivity results indicate soils within the site that are mildly and moderately aggressive to steel (refer Drawing 3, Appendix A). The following corrosion allowances (as per AS 2159 – 2009) should be taken into account by the designer:

- Mild: uniform corrosion allowance 0.01 – 0.02 mm/year;
- Moderate: uniform corrosion allowance 0.02 – 0.04 mm/year.

In instances where a coating is applied to the pile, if the design life of the pile is greater than the design life for the coating, consideration must be given to corrosion of the pile in accordance with the above list.

11. Additional Recommendations and Conclusion

This salinity investigation has been undertaken for the purpose of providing advice with regards to salinity relating to bulk earthworks and service installations only and indicative advice for residential construction. A detailed salinity investigation will be required prior to subdivision certification (after completion of bulk earthworks) in order to provide more detailed recommendations for individual lots. Such an investigation could be carried out as part of the future lot classification investigations.

Additional investigation in development areas which are to be excavated deeper than 3 m below current ground level, are not considered necessary on the basis that there is already a broad range of salinity and aggressivity classifications at the site and that a final salinity investigation will appropriately classify the site after bulk earthworks.

It is considered that the management strategies described herein when incorporated into the design and construction works are appropriate to mitigate the levels of salinity, aggressivity and sodicity identified at the site.

12. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report (or services) for this project at South Creek West, Precinct 5 (Cobbitty Bringelly Precinct), Cobbitty, in accordance with DP's proposal 92225.05.P.001.Rev0 dated 10 October 2022, and acceptance received via email from Mr. Trent Argaet of BHL Group Pty Ltd dated 14 October 2022, on behalf of Boyuan Bringelly Pty Ltd. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Boyuan Bringelly Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the subsurface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Subsurface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the salinity components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

Drawings


Lot 2 DP1216380
Part Lot 45 DP 1104369
Lot 4 DP 1216380
Lot 500 DP 1231858
Lot 4 DP1273487
Lot 1 DP 1273487
The Northern Road
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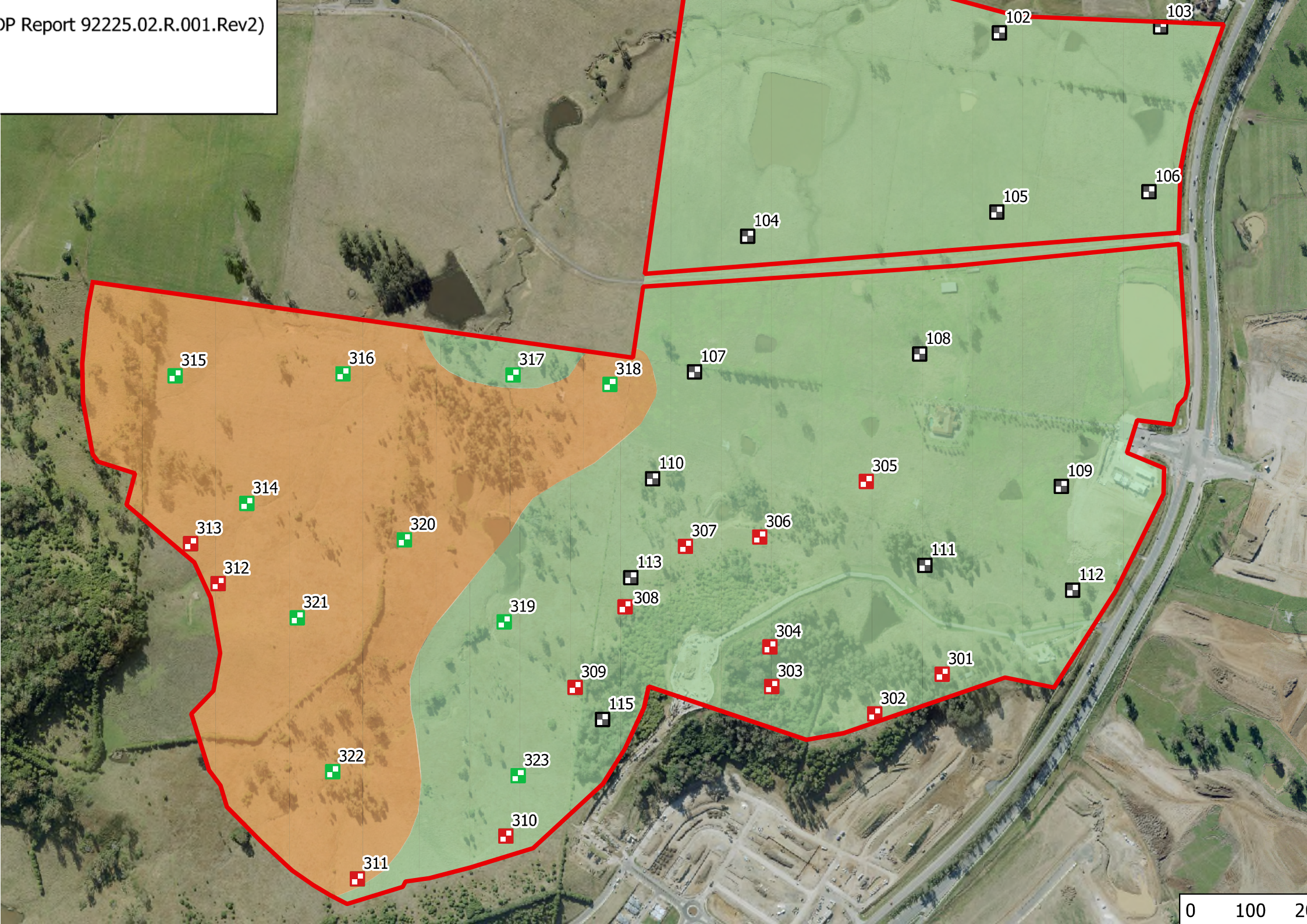
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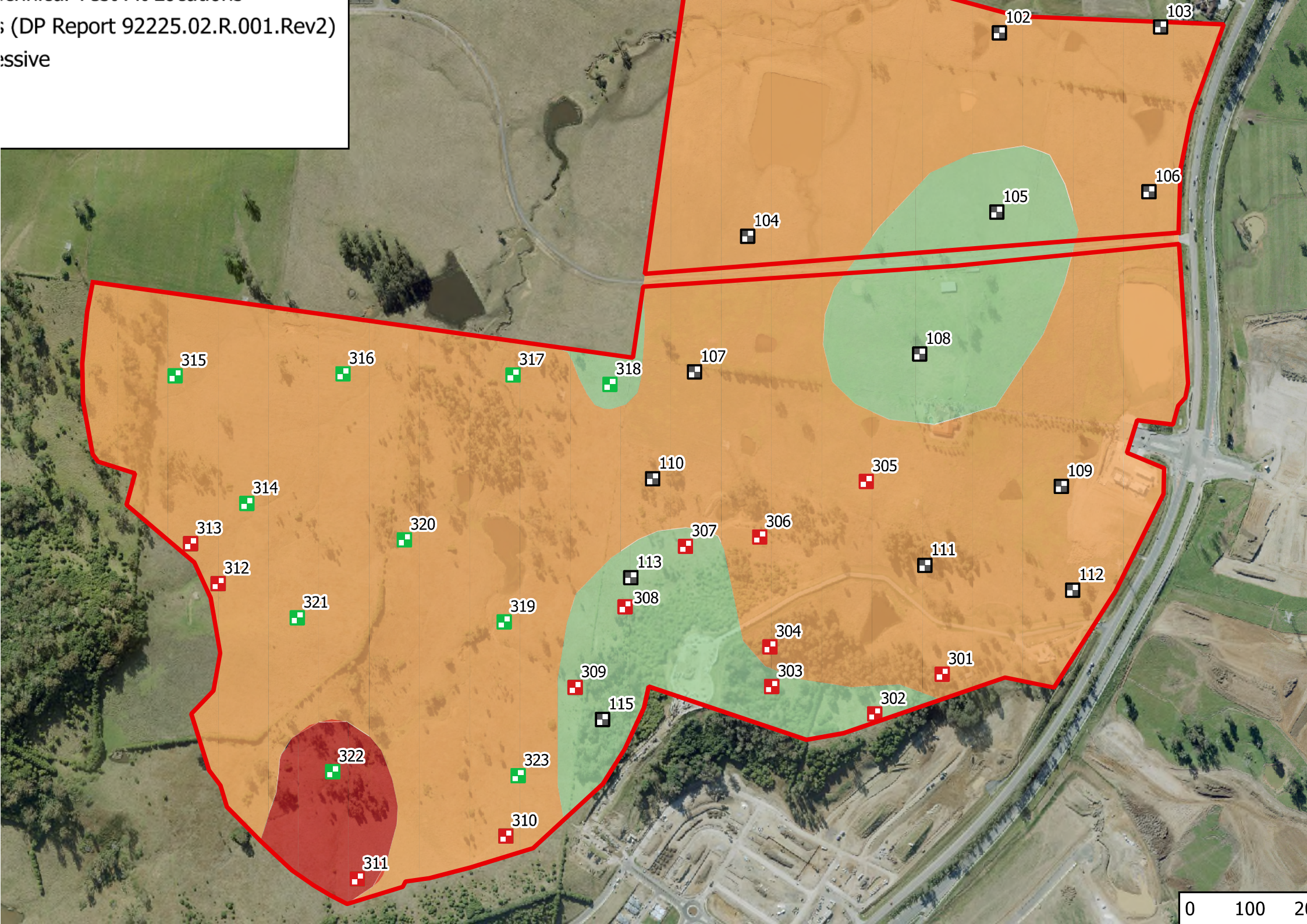

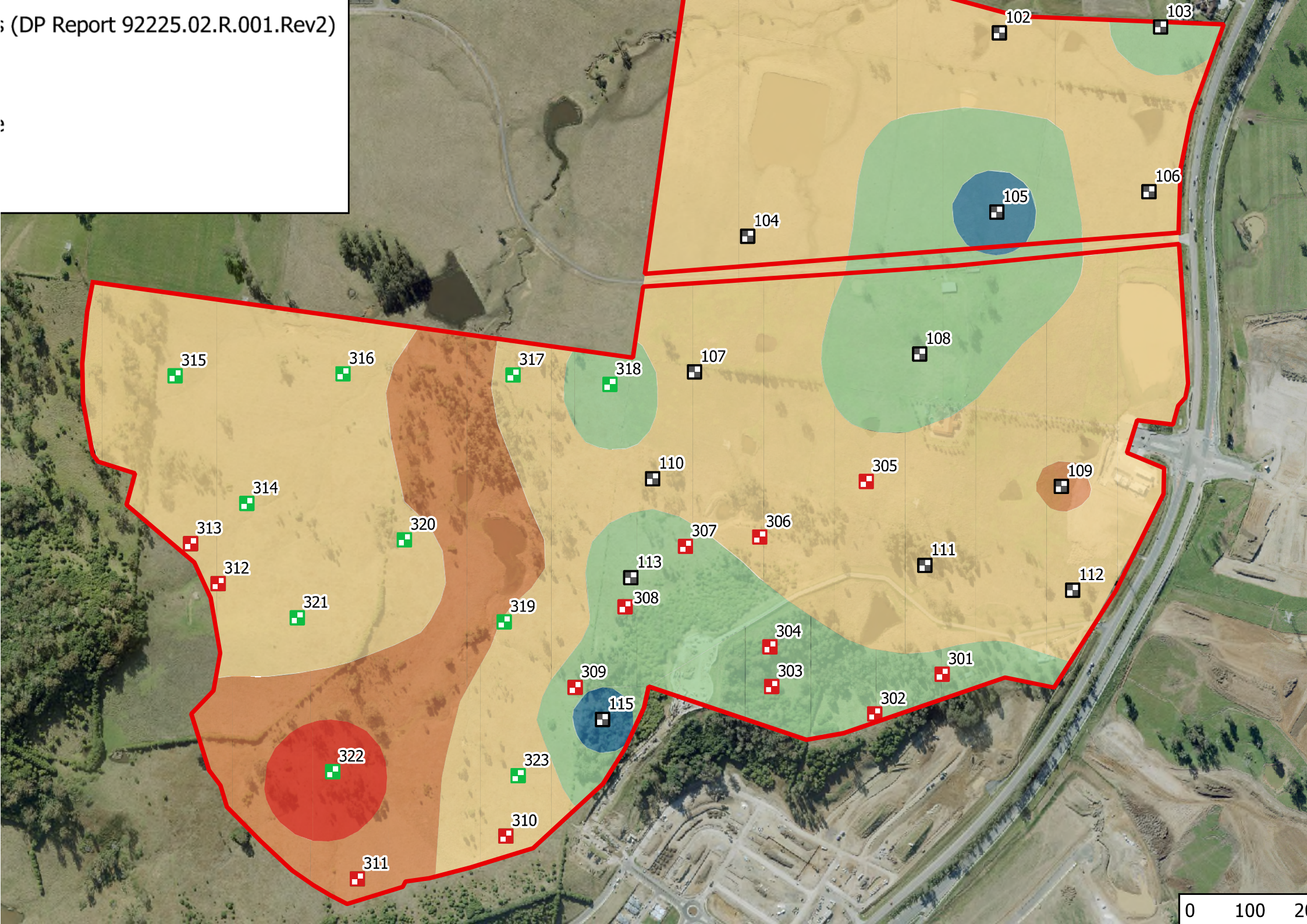
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111
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308
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309
303
301
115
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Appendix B

About this Report

About this Report

November 2020

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

continued next page

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Appendix C

Summary Table

		3165	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		7692	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		2008	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		1495	B	Non-Aggressive		Non-Aggressive		Mild					8
63	47	17575	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	1	10	11	Sodic	7
300	160	1961	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	3	11	24	Highly Sodic	7
		28902	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					9
		3289	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8
		1629	B	Non-Aggressive		Non-Aggressive		Mild					8
		15244	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					9
		9533	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8
		10267	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		12594	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8.5
		1295	B	Non-Aggressive		Non-Aggressive		Mild					8
		2584	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		12392	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		1590	B	Non-Aggressive		Non-Aggressive		Mild					8
		2457	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		8071	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8.5
		8117	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8
		3745	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8.5
1300	130	923	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Moderate	1	11	11	Sodic	8
1200	82	1215	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	3	11	26	Highly Sodic	7
740	74	1473	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	8	24	35	Highly Sodic	7
		3704	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		2049	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		1770	B	Non-Aggressive		Non-Aggressive		Mild					7
		36364	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
400	99	2604	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	6	16	35	Highly Sodic	7
1200	250	1230	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	8	18	44	Highly Sodic	7
310	180	3448	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	1	9	15	Highly Sodic	8
520	140	2421	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	2	9	26	Highly Sodic	7
750	200	1555	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	5	16	31	Highly Sodic	8
48	10	3659	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	1	18	7	Sodic	8.5
890	330	3145	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	4	17	24	Highly Sodic	9
910	300	3174	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	4	15	25	Highly Sodic	10
		2982	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8.5
40	10	11364	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	1	19	4	Non-Sodic	7
520	21	26882	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	4	27	14	Sodic	7
450	22	15198	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	4	21	17	Highly Sodic	8
		1896	B	Non-Aggressive		Non-Aggressive		Mild					7
		2685	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		2735	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		74074	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					8
		8850	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		5271	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		2361	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		2921	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		2935	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
36	10	37037	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	2	21	8	Sodic	7
290	160	10438	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	3	17	19	Highly Sodic	8
		25510	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					7
		8258	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					6
		1530	B	Mild		Non-Aggressive		Mild					7
		1056	B	Mild		Non-Aggressive		Mild					6
		1063	B	Mild		Non-Aggressive	Non-Aggressive	Mild					6

		1702	B	Non-Aggressive		Non-Aggressive		Mild						7
		1532	B	Mild		Non-Aggressive		Mild						6
		1450	B	Mild		Non-Aggressive		Mild						6
		18315	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						6
360	120	2752	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	2					7
		1891	B	Non-Aggressive		Non-Aggressive		Mild						6
550	72	1803	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild						6
		2094	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						10
		2959	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						10
		15106	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						6
		3330	B	Mild		Non-Aggressive		Non-Aggressive						6
		2151	B	Mild		Non-Aggressive		Non-Aggressive						6
		2358	B	Mild		Non-Aggressive		Non-Aggressive						6
		2580	B	Mild		Non-Aggressive		Non-Aggressive						6
		2426	B	Mild		Non-Aggressive		Non-Aggressive						6
		3043	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						6
		1661	B	Non-Aggressive		Non-Aggressive		Mild						6
		1133	B	Non-Aggressive	Non-Aggressive	Non-Aggressive		Mild						7
		1198	B	Non-Aggressive		Non-Aggressive		Mild						7
		1140	B	Non-Aggressive		Non-Aggressive		Mild						6
		1565	B	Non-Aggressive	Non-Aggressive	Non-Aggressive		Mild						7
		9950	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						6
1100	280	1037	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild						6
		1046	B	Mild		Non-Aggressive		Mild						6
470	82	1219	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	3					6
		1201	B	Mild		Non-Aggressive		Mild						9
		1303	B	Mild		Non-Aggressive		Mild						7
		16750	B	Non-Aggressive	Non-Aggressive	Non-Aggressive		Non-Aggressive						6
		1551	B	Mild		Non-Aggressive		Mild						8
		1604	B	Mild		Non-Aggressive		Mild						6
		3095	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						7
390	280	284	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Moderate	2					7
		1654	B	Mild		Non-Aggressive		Mild						6
590	220	1661	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild	3					9
		1416	B	Mild		Non-Aggressive		Mild						9
740	230	1619	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Mild						9
		1328	B	Mild		Non-Aggressive		Mild						7
		3737	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						6
		1643	B	Non-Aggressive		Non-Aggressive		Mild						7
		1442	B	Non-Aggressive		Non-Aggressive		Mild						6
		1852	B	Non-Aggressive		Non-Aggressive		Mild						6
		1950	B	Non-Aggressive		Non-Aggressive		Mild						6
		2038	B	Non-Aggressive		Non-Aggressive		Non-Aggressive						8

Appendix D

Logs

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 90 mAHD
EASTING: 289823
NORTHING: 6237792

PIT No: 101
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
90	0.4	TOPSOIL/Silty CLAY CI: brow, trace gravel and sand, rootlets in top 0.1m, w<PL							
89	1	Silty CLAY CI: grey, brown, yellow and red mottled, trace gravel and sand, w<PL, hard		Dx2	0.5				
				U_{50}	0.9		pp ≥400		
				D	1.0				
	1.4								
88	2	Silty CLAY CI: grey and red brown, trace sandstone gravel, w<PL, hard - becoming grey below 1.7m		Dx2	1.5		pp ≥400		
				D	2.0		pp = 300		
	2.2	SANDSTONE: brown, with iron staining, low to medium strength, highly to moderately weathered		D	2.5				
	2.6	Pit discontinued at 2.6m - refusal on low to medium strength sandstone							
87	3								
86	4								
85	5								
84	6								
83	7								
82	8								
81	9								

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 88 mAHD
EASTING: 290291
NORTHING: 6237683

PIT No: 102
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
88	0.4	TOPSOIL/Silty CLAY CI: brown, trace gravel, rootlets in top 0.05m, w<PL							
87	1.8	Silty CLAY CI: red brown, trace ironstone gravel, w<PL, hard		D	0.5		pp >400		
				D/B	1.0		pp >400		
				D	1.5		pp >400		
86	3.0	Silty CLAY CI: grey and red brown mottled, trace sandstone gravel, w<PL, very stiff		D	2.0		pp = 300		
				D	2.5		pp = 300		
85		Pit discontinued at 3.0m - limit of investigation		D	3.0				
84									
83									
82									
81									
80									
79									

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 95 mAHD
EASTING: 290561
NORTHING: 6237693

PIT No: 103
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
95	0.3	TOPSOIL/Silty CLAY CI: brown, trace rootlets in top 0.1m, w<PL							
		Silty CLAY CI: red brown and grey mottled, trace gravel and sand, w<PL, hard		Dx2	0.5				
94	1			D	1.0				
	1.2	SANDSTONE: fine grained, grey, low strength, moderately weathered		Dx2	1.5				
		- becoming brown, low to medium strength, moderately weathered							
93	2 2.0	Pit discontinued at 2.0m		D	2.0				
		- refusal on low to medium strength sandstone							
92	3								
91	4								
90	5								
89	6								
88	7								
87	8								
86	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 94 mAHD
EASTING: 289871
NORTHING: 6237343

PIT No: 104
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
94	0.2	TOPSOIL/Silty CLAY CI: with rootlets in top 0.1m, w<PL							
	0.6	Silty CLAY CI: brown, trace gravel and sand, w<PL, hard		Dx2	0.5		pp >400		
93	1	Silty CLAY CI: red brown and grey mottled, trace gravel and sand, w<PL, hard		D	1.0				
				Dx2	1.5				
		- becoming more grey with depth below 1.7m							
92	2			D	2.0				
				Dx2	2.5		pp >400		
		- becoming extremely weathered below 2.8m							
91	3	3.0 Pit discontinued at 3.0m		D	3.0				
		- limit of investigation							
90	4								
89	5								
88	6								
87	7								
86	8								
85	9								

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 97 mAHD
EASTING: 290287
NORTHING: 6237383

PIT No: 105
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
97	0.2	TOPSOIL/Silty CLAY CI: brown, with rootlets in top 0.1m, w<PL							
	0.5	Silty CLAY CI: brown, trace gravel and sand, w<PL, hard		Dx2/B	0.35 0.5		pp ≥400		
96	1	Silty CLAY CI: red brown, trace gravel and sand, w<PL, hard		D	1.0				
				Dx2	1.5		pp ≥400		
95	2			D	2.0				
	2.2	SANDSTONE: fine grained, pale grey and brown, with iron staining, low strength, highly to moderately weathered							
	2.5	Pit discontinued at 2.5m - refusal on low to medium strength sandstone		Dx2	2.5				
94	3								
93	4								
92	5								
91	6								
90	7								
89	8								
88	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 95 mAHD
EASTING: 290542
NORTHING: 6237417

PIT No: 106
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
95	0.15	TOPSOIL/Silty CLAY CI: brown, trace gravel and sand, with rootlets in top 0.05m, w<PL, hard							
		Silty CLAY CI: brown and red brown, trace gravel and sand, w<PL, hard		Dx2	0.5		pp >400		
94	1			D	1.0				
		- becoming red grey mottled below 1.2m		Dx2	1.5				
		- becoming grey, red, yellow mottled below 1.6m							
93	1.9	SHALE: mid grey, with iron staining, low strength, highly to moderately weathered, Bringelly Shale		D	2.0				
	2			Dx2	2.5				
92	3	- becoming extremely weathered below 2.8m		D	3.0				
	3.0	Pit discontinued at 3.0m - limit of investigation							
91	4								
90	5								
89	6								
88	7								
87	8								
86	9								

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 102 mAHD
EASTING: 289782
NORTHING: 6237116

PIT No: 107
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
102	0.2	TOPSOIL/Silty CLAY CI: trace rootlets in top 0.05m, w<PL							
		Silty CLAY CI: red brown and grey mottled, becoming more grey with depth, trace ironstone and sandstone bands, w<PL		Dx2	0.5				
101	1			D	1.0				
				Dx2	1.5				
100	2			D	2.0				
	2.1	SANDSTONE: fine grained, grey, becoming more brown with depth, with iron staining, low strength, highly to moderately weathered		Dx2	2.5				
99	3			D	3.0				
	3.0	Pit discontinued at 3.0m - limit of investigation							
98	4								
97	5								
96	6								
95	7								
94	8								
93	9								

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 105 mAHD
EASTING: 290158
NORTHING: 6237146

PIT No: 108
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
105	0	FILL/Silty CLAY CI: with rootlets in top 0.1m, trace gravel and anthropogenics comprising brick fragments, roof tiles, pipe, metal, concrete, w<PL		Dx2	0.5		pp >400		
				U_{50}	0.9				
104	1	Silty CLAY CI: medium plasticity, red brown, trace gravel, with sandstone bands, w<PL, hard		D	1.0				
				Dx2	1.5		pp >400		
103	2			D	2.0				
	2.4	SANDSTONE: fine grained, brown and grey, with iron staining, very low to low strength, highly to moderately weathered		Dx2	2.5				
102	3			D	3.0				
	3.0	Pit discontinued at 3.0m - limit of investigation							
101	4								
100	5								
99	6								
98	7								
97	8								
96	9								

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 104 mAHD
EASTING: 290395
NORTHING: 6236925

PIT No: 109
PROJECT No: 92225.02
DATE: 3/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
104	0.3	TOPSOIL/Silty CLAY CI: trace rootlets in top 0.15m, w<PL							
		Silty CLAY CI: brown, trace gravel, w<PL, hard		Dx2	0.5		pp >400		
		- becoming red brown, very stiff below 0.6m		D	1.0				
				Dx2	1.5				
		- becoming red brown grey mottled below 1.8m			1.8		pp = 350		
				D	2.0				
102	2.1	SANDSTONE: fine grained, grey and brown, with iron staining, low strength, highly to moderately weathered		Dx2	2.5				
		- becoming extremely weathered with depth							
101	3.0	Pit discontinued at 3.0m - limit of investigation		D	3.0				

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 105 mAHD
EASTING: 289712
NORTHING: 6236938

PIT No: 110
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
105	0.05	TOPSOIL/Silty CLAY CI: brown, trace rootlets, w<PL							
	0.3	Silty CLAY CI: brown, w<PL, hard							
104	1	Silty CLAY CI: medium to high plasticity, red brown and grey, yellow mottled, with ironstone gravel, w<PL, hard, residual			1.0		pp ≥400		
	1.4	Silty CLAY CH: high plasticity, pale grey, with iron staining (red and yellow), with very low to low strength siltstone bands, (extremely weathered siltstone, residual)							
103	2								
	2.1	SILTSTONE: pale brown and grey, with iron staining, with clay seams, very low to low strength, moderately to slightly weathered - no clay seams below 2.7m							
102	3								
	3.0	Pit discontinued at 3.0m - limit of investigation							
101	4								
100	5								
99	6								
98	7								
97	8								
96	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 113 mAHD
EASTING: 290167
NORTHING: 6236793

PIT No: 111
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
113	0.1	TOPSOIL/Silty CLAY CI: trace rootlets, w<PL							
	0.4	Silty CLAY CI: brown, trace gravel, w<PL, hard							
		Silty CLAY CI: medium to high plasticity, orange brown, trace ironstone and siltstone gravel, hard		Dx2	0.5				
112	1			D/B	1.0				
				Dx2	1.5				
111	2	- becoming grey and orange/red mottled, with siltstone (possible sandstone) bands (possible extremely weathered siltstone)		D	2.0				
				Dx2	2.5				
110	3	3.0 Pit discontinued at 3.0m - limit of investigation		D	3.0				
109	4								
108	5								
107	6								
106	7								
105	8								
104	9								

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 111 mAHD
EASTING: 290414
NORTHING: 6236752

PIT No: 112
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
111	0.05	TOPSOIL/Silty CLAY CI: trace rootlets, w<PL							
	0.3	Silty CLAY CI: w<PL, hard							
	0.6	Silty CLAY CI; medium to high plasticity, brown, w<PL, hard, residual		Dx2	0.5				
				U_{50}					
110	1	Silty CLAY CH: high plasticity, red brown and grey mottled, becoming grey with depth, w<PL, hard			0.9				
				D	1.0				
	1.4	SILTSTONE: pale grey and brown, with iron staining, with clay seams, low strength, highly weathered		Dx2	1.5				
109	2			D	2.0				
		-becoming extremely weathered below 2.1m							
				Dx2	2.5				
108	3			D	3.0				
	3.0	Pit discontinued at 3.0m -limit of investigation							
107	4								
106	5								
105	6								
104	7								
103	8								
102	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

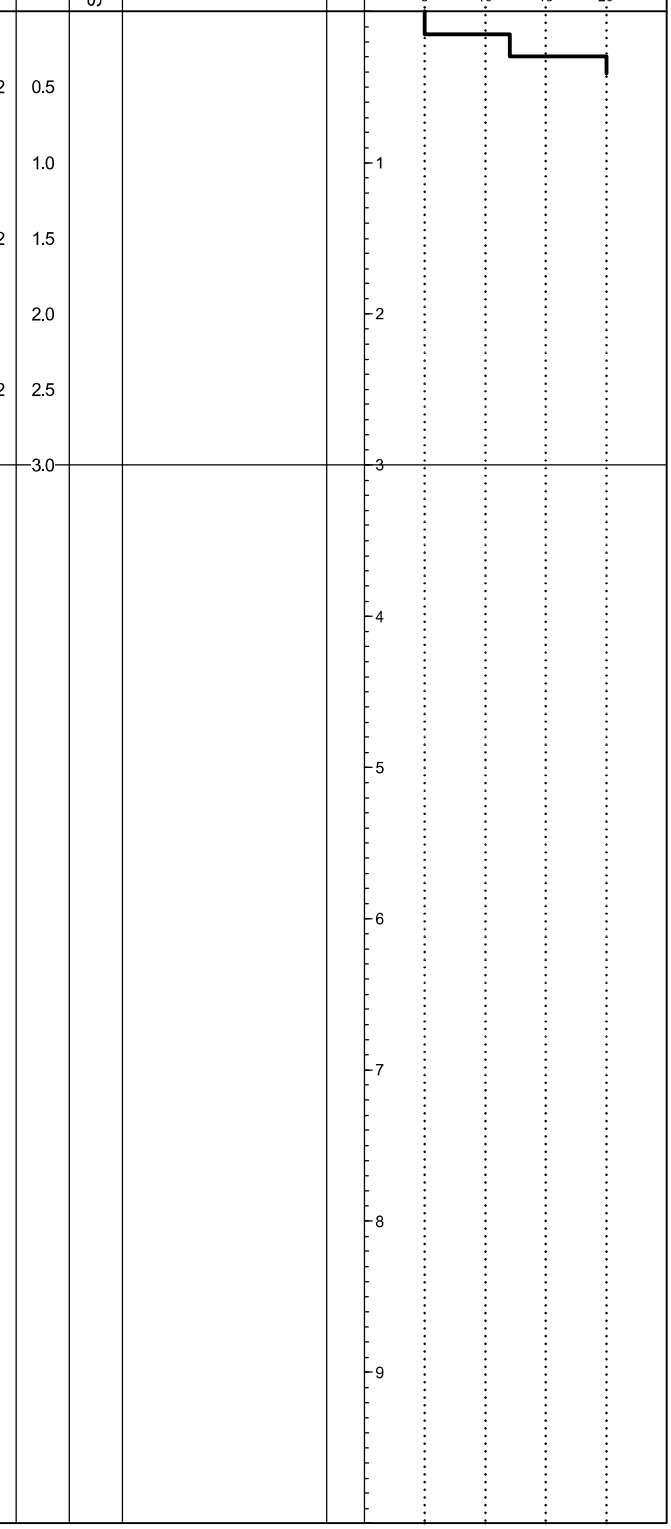
TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 114 mAHD
EASTING: 289676
NORTHING: 6236773

PIT No: 113
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
114	0.05	TOPSOIL/Silty CLAY CI: brown, trace rootlets, w<PL							
	0.2	Silty CLAY CI: brown, w<PL, hard							
		Silty CLAY CI: medium to high plasticity, orange brown, w<PL, hard		Dx2	0.5				
113	1	- becoming orange brown and grey mottled, trace ironstone gravel below 0.7m		D	1.0				
				Dx2	1.5				
	1.6	Silty CLAY CI: medium to high plasticity, pale brown and grey, with iron staining, with siltstone (possible sandstone) bands, w<PL, very low strength, highly to slightly weathered		D	2.0				
112	2	- becoming more grey, banding decreasing, hard below 2.4m		Dx2	2.5				
		- banding increasing below 2.8m							
111	3	3.0 Pit discontinued at 3.0m		D	3.0				
		- limit of investigation							
110	4								
109	5								
108	6								
107	7								
106	8								
105	9								



RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 148 mAHD
EASTING: 289750
NORTHING: 6236549

PIT No: 114
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
148		Silty CLAY CI: red brown, w<PL, hard, residual		D	0.5				
	0.6	SANDSTONE: fine to medium grained, low to medium strength, highly to slightly weathered, horizontally bedded, Bringelly Shale		D	0.9				
147	0.9	Pit discontinued at 0.9m - refusal on medium strength sandstone							
146	2								
145	3								
144	4								
143	5								
142	6								
141	7								
140	8								
139	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 119 mAHD
EASTING: 289628
NORTHING: 6236536

PIT No: 115
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
119	0.05	TOPSOIL/Silty CLAY CI: trace ironstone gravel and rootlets, w<PL							
	0.4	Silty CLAY CI: trace ironstone gravel, w<PL, hard		Dx2	0.5				
		Silty CLAY CI: brown, trace ironstone gravel, w<PL, hard, residual							
118	1.0	- becoming orange brown and dark grey mottled		D	1.0				
		Silty CLAY CH: high plasticity, brown and grey mottled, trace ironstone and sandstone bands, w<PL, hard, residual		Dx2	1.5				
117	1.9	SANDSTONE: fine grained, pale brown, iron staining, with ironstone gravel, low strength, highly to slightly weathered, Bringelly Shale		D	2.0				
				Dx2	2.5				
116	3.0	Pit discontinued at 3.0m - limit of investigation		D	3.0				
115	4								
114	5								
113	6								
112	7								
111	8								
110	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 131 mAHD
EASTING: 289922
NORTHING: 6236441

PIT No: 116
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
131	0.15	TOPSOIL/Silty CLAY CI: brown, trace gravel, with rootlets, w<PL, stiff							
	0.6	Silty CLAY CI: medium to high plasticity, orange brown, slightly mottled, with angular siltstone gravel (colluvium), w<PL, stiff		Dx2/B	0.5				
130	1	SILTSTONE: pale brown and grey, with clay seams, very low to low strength, highly to slightly weathered		D	1.0				
		-with clay seams, becoming low strength below 1.0m		Dx2	1.5				
129	2			D	2.0				
				Dx2	2.5				
	2.8	-becoming low to medium strength at 2.6m							
128	3	Pit discontinued at 2.8m -limit of investigation		D	3.0				
127	4								
126	5								
125	6								
124	7								
123	8								
122	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 125 mAHD
EASTING: 290014
NORTHING: 6236427

PIT No: 117
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
125	0.1	TOPSOIL/Silty CLAY CI: brown, fissured, with rootlets, trace gravel (colluvium), w<PL							
	0.6	Silty CLAY CI: brown, fissured, trace SR ironstone and SA siltstone gravel (colluvium), w<PL			0.5				
124	1.0	Silty CLAY CI: orange brown, fissured, trace ironstone gravel, w<PL, residual		U_{50} D	0.7 0.9				
		Silty CLAY CI: medium to high plasticity, orange brown and grey mottled, trace SR siltstone gravel, w<PL, residual		D	1.1				
		- very low to medium strength band below 1.5m		Dx2	1.5				
	1.7	Clayey SILT ML: pale grey and orange mottled, friable, with very low to low strength siltstone seams, w<PL (extremely weathered siltstone)		D	2.0				
123	2.0	SILTSTONE: pale orange and brown, with iron staining, low to medium strength, moderately to slightly weathered, Bringelly Shale		Dx2	2.5				
	2.8	- becoming medium strength below 2.7m							
122	3	Pit discontinued at 2.8m							
		- limit of investigation							
121	4								
120	5								
119	6								
118	7								
117	8								
116	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621 - 705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 117 mAHD
EASTING: 290123
NORTHING: 6236402

PIT No: 118
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
117	0.2	TOPSOIL/Silty CLAY CI: brown, with rootlets to 0.1m, trace gravel, w<PL, residual							
		Silty CLAY CI: red brown and grey mottled, trace gravel, w<PL, very stiff to hard, residual		Dx2	0.5				
116	0.9								
	1	SILTSTONE: pale grey and red brown, with clay seams, very low to low strength, moderately to slightly weathered, Bringelly Shale		D	1.0				
				Dx2	1.5				
115	2	- becoming low to medium strength, no clay seams below 2.0n		D	2.0				
				Dx2	2.5				
114	3			D	3.0				
	3.0	Pit discontinued at 3.0m - limit of investigation							
113	4								
112	5								
111	6								
110	7								
109	8								
108	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Rezoning
LOCATION: 621-705 The Northern Road, Cobbitty, NSW

SURFACE LEVEL: 113 mAHD
EASTING: 290301
NORTHING: 6236517

PIT No: 119
PROJECT No: 92225.02
DATE: 4/2/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
113	0.15	TOPSOIL/Silty CLAY CI: brown, fissured, with rootlets, w<PL, stiff							
		Silty CLAY CI: medium to high plasticity, orange brown and grey mottled, fissured, trace ironstone and siltstone gravel, w<PL, stiff, residual		Dx2	0.5				
112	1	- becoming hard below 0.6m		D	1.0				
		- becoming grey and orange brown mottled, extremely weathered siltstone below 1.2m		Dx2	1.5				
	1.6	SILTSTONE: pale grey and brown, with yellow and red iron staining, low to medium strength, moderately to slightly weathered, Bringelly Shale							
111	2			D	2.0				
	2.1	Pit discontinued at 2.1m - refusal on low to medium strength siltstone							
110	3								
109	4								
108	5								
107	6								
106	7								
105	8								
104	9								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere 315SE backhoe - 450mm toothed bucket

LOGGED: ERL

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 124.3 mAHD
COORDINATE E: 290196 **N:** 6236611
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 301
PROJECT No: 92225.06
DATE: 18/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
18/11/22, No free groundwater observed	124	0.0	TOPSOIL/(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine to medium grained, angular to sub-rounded; with rootlets and tree roots		TOP	ST						D		0.1	DCP/150	5 10 15
		0.3	(CI-CH) Silty CLAY; red-brown and orange brown; medium to high plasticity; trace roots and rootlets		RES	VST	<PL					D		0.5		
	123	0.7	SHALE; red-brown, grey brown and brown; with silty clay bands; Bringelly Shale			VST		XW-HW	0.7	VL		D		1.0		23 25/70mm
		1							1.12	L						
								HW		M						
			1.4-1.8m: bands of low to medium strength, moderately weathered shale						1.4	H		D		1.5		
								HW-MW		VH						
	122	2							1.8	EH		D		2.0		
								HW								
			2.6-2.8m: red-brown, grey brown and grey					MW	2.6	L-M		D		2.5		
		2.8	Test pit discontinued at 2.80m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						2.8							
	121	3												3		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

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Photo 1 - View of side of Test Pit 301

Photo 2 - View of side of Test Pit 301

Douglas Partners Geotechnics | Environment | Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D1
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 138.1 mAHD
COORDINATE E: 290083 **N:** 6236545
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 302
PROJECT No: 92225.06
DATE: 18/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
18/11/22, No free groundwater observed	138	0.0	TOPSOIL/(ML) Clayey SILT, with gravel, trace sand; brown; silt fraction low plasticity; gravel fraction fine to medium, sub-angular; sand fraction fine; with rootlets		TOP	F	<PL					D		0.1	DCP/150	5 10 15
		0.4	SANDSTONE; red-brown and grey brown; fine; with sandy clay bands; Bringelly Shale					XW-HW	0.4	L-M		D		0.5		
		1										D		1.0		21 25/90mm
	137	1.1	SHALE; grey brown, grey and orange brown; with silty clay bands; Bringelly Shale					HW	1.1	VL-L						
		1.8	SHALE; grey brown and brown; with low to medium strength sandstone bands and silty clay bands; Bringelly Shale						1.8			D		1.5		
		2										D		2.0		
	136							HW-MW		L-M						
												D		2.5		
		3.0	Test pit discontinued at 3.00m depth Limit of investigation. Terminated in low to medium strength shale						3.0			D		3.0		
	135															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 31/01/23 17:13. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 3 - View of side of Test Pit 302

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D2
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 129.1 mAHD
COORDINATE E: 289911 **N:** 6236591
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 303
PROJECT No: 92225.06
DATE: 18/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	SAMPLE DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
18/11/22, No free groundwater observed	129	0.0	(CL-CI) Silty CLAY; dark brown; clay fraction low to medium plasticity; fraction fine, sub-angular to sub-rounded; with rootlets		COL	ST						D		0.1	DCP/150	5 10 15
		0.4	(CI) Silty CLAY, trace gravel; brown and grey brown; clay fraction medium plasticity; gravel fraction sub-angular to sub-rounded; trace rootlets and decomposed organic matter			ST - VST	=PL					D		0.5		
	128	1	1.1m: trace fine to medium grained, sub-rounded to sub-angular gravel		RES							D		1.0		
			1.4m: trace fine to coarse grained, sub-rounded to sub-angular gravel			VST - H										
		1.7	(CL-CI) Gravelly Silty CLAY; grey and grey brown; clay fraction low to medium plasticity; gravel fraction fine to medium, angular and sub-rounded; appears to be shaly clay				<PL					D		1.5		
	127	2			XWM	H						D		2.0	PP	>600
		2.3	SHALE; brown, grey brown and dark grey; with medium strength sandstone bands; Bringelly Shale					HW-MW	2.3	VL-L		D		2.5		
									2.9	L-M						
	126	3										D		3.0		
		3.2	Test pit discontinued at 3.20m depth Limit of investigation. Terminated in low to medium strength shale						3.2							

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

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Photo 4 - View of side of Test Pit 303

Photo 5 - View of inferred colluvial spoil from Test Pit 303

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D3
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 132.5 mAHD
COORDINATE E:289908 N: 6236657
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 304
PROJECT No: 92225.06
DATE: 18/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
18/11/22, No free groundwater observed	132	0.0	(ML) Clayey SILT, trace gravel; dark brown; clay fraction medium; gravel fraction fine to coarse, angular and sub-rounded; trace angular sandstone cobbles, with rootlets and tree roots		COL	ST	<PL					D		0.1	DCP/150	5 10 15
		0.3	(CI-CH) Silty CLAY, with gravel; red brown and grey brown; clay fraction medium to high plasticity; gravel fraction fine to coarse, angular to sub-angular; trace rootlets, tree roots and decomposed organic matter		RES	ST - VST	<PL - =PL					D		0.5		
		0.7	(CL-CI) Silty Gravelly CLAY; orange-brown, grey and grey brown; clay fraction low to medium plasticity; gravel fraction fine to coarse, sub-angular to angular; with bands of low to medium strength sandstone appears to be shaly clay		XWM	VST	<PL					D		1.0		23
	131	1.5	SHALE; red brown, brown and grey; Bringelly Shale			H		XW-HW	1.5	VL-L		D		1.5		
								HW-MW	1.9	L-M		D		2.0		
	130	2.5	Test pit discontinued at 2.50m depth Limit of investigation. Refusal on moderately weathered, medium strength shale					MW	2.3			D		2.5		
	129	3												3		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

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PLANT: JCB 4CX 8t Backhoe
OPERATOR: WC
LOGGED: DN
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface. Top layer thickens downslope to 0.6m thick. Residual layer reduces in thickness downslope

Photo 6 - View of side of Test Pit 304

Photo 7 - View of side of Test Pit 304

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D4
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1216380

SURFACE LEVEL: 112.9 mAHD
COORDINATE E: 290069 **N:** 6236933
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 305
PROJECT No: 92225.06
DATE: 27/01/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	SAMPLE DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
	112	0.0	(CL-CI) Silty CLAY, with gravel; dark grey brown and brown; clay fraction low to medium plasticity; gravel fraction fine to medium, sub-rounded to sub-angular; trace tree roots and rootlets		COL	F - ST	<PL					D		0.1	DCP/150	5 10 15
		0.3	(CL-CI) Gravelly Silty CLAY; grey, brown and red brown; clay fraction low to medium plasticity; fraction fine to medium, sub-angular to angular gravel; trace rootlets and decomposed organic matter, appears to be shaly clay		XWM	ST - VST	<PL					D		0.5		
		0.7	SHALE; grey, grey brown and orange brown; Bringelly Shale					HW-MW	0.7	VL-L		D		1.0		
	111	1										D		1.5		
		2	2.1m: red brown and grey brown						2.1	L		D		2.0		
			2.7m: brown, grey brown and dark grey						2.7	L-M		D		2.5		
	110	2.9	Test pit discontinued at 2.90m depth						2.9			D		2.9		
		3	Limit of investigation. Refusal on moderately weathered, medium strength shale											3		
	109															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
OPERATOR: WC
LOGGED: DN
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface. Located upslope of a nearby dam

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Photographs 8 and 9 - View of side and end of Test Pit 305

Photo 10 - View of inferred colluvial spoil from Test Pit 305

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D5
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 115 mAHD
COORDINATE E: 289891 **N:** 6236840
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 306
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
17/11/22, No free groundwater observed	114	0.0	TOPSOIL/(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular; with rootlets		TOP	F	<PL					D		0.1	DCP/150	5 10 15
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown and brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST	=PL					D		0.5		
		0.7	(CI) Silty CLAY, with gravel; red brown, brown and brown grey; clay fraction medium plasticity; gravel fraction fine to medium, angular to sub-angular		RES	VST-H	<PL					D		1.0		25/100mm
		1.2	SHALE; grey brown and red-brown; Bringelly Shale					HW	1.2	VL-L		D		1.5		
								HW-MW	1.5	L-M						
		1.8	Test pit discontinued at 1.80m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						1.8							
	113	2												2		
	112	3												3		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 31/01/23 17:13. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 11 - View of side of Test Pit 306

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D6
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 115.8 mAHD
COORDINATE E: 289767 **N:** 6236825
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 307
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
17/11/22, No free groundwater observed		0.0	TOPSOIL/(CL-CI) Silty CLAY, trace gravel; dark brown; clay fraction low to medium plasticity; gravel fraction fine, sub-angular; with rootlets		TOP	F	<PL					D		0.1	DCP/150	5 10 15
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown and brown grey; clay fraction medium to high plasticity; silt fraction medium; gravel fraction fine, sub-angular; trace rootlets and decomposed organic matter		RES	F	=PL					D		0.5		
	115	0.8	(CI) Silty CLAY, with gravel; red brown mottled pale grey; clay fraction medium plasticity; gravel fraction fine to medium, angular to sub-angular		RES	ST	<PL					D		1.0		
		1														
		1.2	SHALE; pale grey and red-brown; Bringelly Shale					HW	1.2	VL-L		D		1.5		
	114		1.5m: brown, grey and red-brown						1.5							
		2						HW-MW				D		2.0		
			2.2m: grey brown, red brown and dark grey						2.2	L-M						
			2.6m: grey brown and dark grey					MW	2.6			D		2.5		
	113	2.7	Test pit discontinued at 2.70m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						2.7			D		2.7		
		3												3		
	112															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 31/01/23 17:13. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 12 - View of side of Test Pit 307

Photo 13 - View of side of Test Pit 307

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D7
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 4 DP1273487

SURFACE LEVEL: 116.8 mAHD
COORDINATE E: 289666 **N:** 6236724
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 308
PROJECT No: 92225.06
DATE: 18/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
18/11/22, No free groundwater observed		0.0	(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular to sub-rounded; with rootlets		COL							D		0.1		
		0.2	(CI) Silty CLAY, trace gravel; yellow brown and grey brown; clay fraction medium plasticity; gravel fraction sub-angular to sub-rounded; trace rootlets		RES	ST								0.5		
	116	0.6	(CL-CI) Gravelly Silty CLAY; red brown and pale grey; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular to sub-angular; appears to be shaly clay		XWM	VST	<PL					D		1.0	DCP/150	5 10 15
		1				H										
		1.7	SHALE; red brown, brown and pale grey; with silty clay bands; Bringelly Shale					HW	1.7	VL-L		D		1.5		
	115		2.1m: red brown, grey brown and dark grey						2.1							
		2						HW-MW		L-M		D		2.0		
			2.6m: grey brown and dark grey						2.6			D		2.5		
	114	2.8	Test pit discontinued at 2.80m depth Limit of investigation. Refusal on moderately weathered, medium strength shale					MW	2.8			D		2.8		
		3												3		
	113															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
OPERATOR: WC
LOGGED: DN
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

EXPORTED 31/01/23 17:13. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

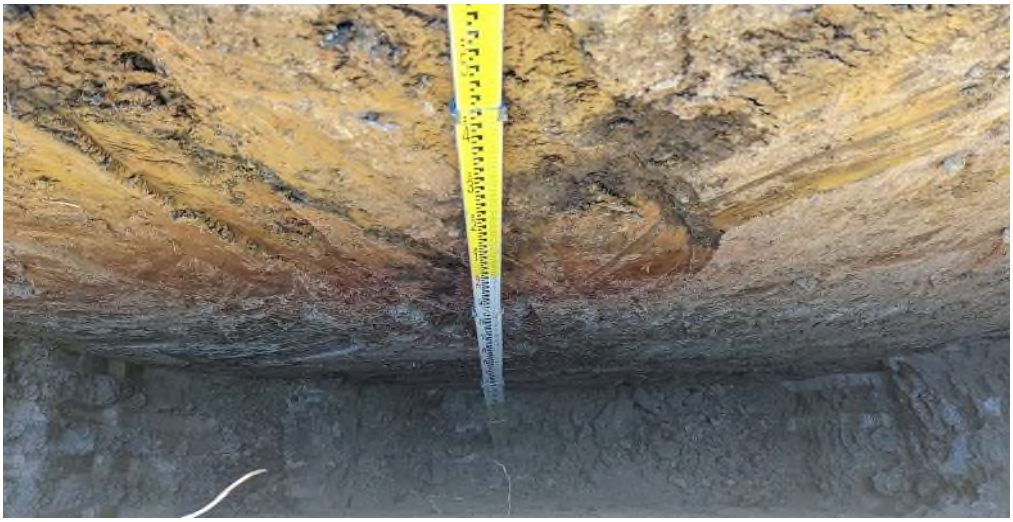

Photo 14 - View of side of Test Pit 308

Photo 15 - View of side of Test Pit 308

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D8
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 112.9 mAHD
COORDINATE E: 289583 **N:** 6236589
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 309
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
17/11/22, No free groundwater observed		0.0	(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular to sub-rounded; with rootlets and tree roots		COL	F	<PL					E		0.0		
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular to sub-rounded; trace rootlets		COL	F	<PL - =PL							0.1		
		0.4	(CL-CI) Silty CLAY, with gravel, trace sand; brown and grey brown; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular and sub-rounded; sand fraction fine		COL possibly RES	ST						E		0.5	DCP/150	5 10 15
	112	0.9	(CL-CI) Silty CLAY, trace sand; brown and grey brown; clay fraction low to medium plasticity; sand fraction fine													
		1				VST	<PL					E		1.0		
					RES										PP	>600
						H										
	111	2										E		2.0		
		2.1	SHALE; grey, red brown and brown; Bringelly Shale						2.1							
								HW		VL-L		E		2.5		
	110		2.9m: dark grey, brown grey and red brown						2.9							
		3						HW-MW		L-M		E		3.0		
		3.1	Test pit discontinued at 3.10m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						3.1							
	109															

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:23. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photographs 16 and 17 - View of side and end of Test Pit 309

Photo 18 - inferred colluvial spoil from Test Pit 309

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D9
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 121.7 mAHD
COORDINATE E: 289467 **N:** 6236341
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 310
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
17/11/22, No free groundwater observed		0.0	TOPSOIL/(CL-CI) Silty CLAY, trace gravel; dark brown; clay fraction low to medium plasticity; gravel fraction fine, sub-angular		TOP	S - F						E		0.0		
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown and grey brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	F	=PL							0.1		
	121											E		0.5		
		1				ST						E		1.0	DCP/150	5 10 15
		1.3	(CI) Silty CLAY, trace gravel, trace sand; red-brown, grey and brown; clay fraction medium plasticity; gravel fraction angular to sub-angular; sand fraction fine; trace rootlets		RES	VST - H	<PL					E		1.5		
	120	2										E		2.0		
		2.2	SHALE; pale grey and red brown; with silty clay bands; Bringelly Shale					XW	2.2	VL						
									2.8			E		2.5		
	119	3						HW		VL-L				3.0		
		3.3	Test pit discontinued at 3.30m depth Limit of investigation. Refusal on highly to moderately weathered, low to medium strength shale						3.3							
	118															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

Photo 19 - View of side of Test Pit 310

Photo 20 - View of side and end of Test Pit 310

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D10
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 119.5 mAHD
COORDINATE E: 289219 **N:** 6236269
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 311
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	119	0.0	TOPSOIL/(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular; with rootlets		TOP	F						E		0.0		
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown and brown; clay fraction medium to high plasticity; gravel fraction fine to medium, sub-angular to sub-rounded; trace rootlets		RES	ST	=PL					E		0.1		
	118	0.6	(CI-CH) Silty CLAY, with gravel; red brown and grey; clay fraction medium to high plasticity; gravel fraction fine to medium; trace rootlets		RES	ST VST	<PL					E		0.5	DCP/150	5 10 15
		1										E		1.0		
		1.7	SHALE; red brown and brown grey; with low to medium strength sandstone bands; Bringelly Shale					HW-MW	1.7	VL-L		E		1.5		
	117	2							2.0	L-M		E		2.0		
		2.2	Test pit discontinued at 2.20m depth Limit of investigation. Refusal on moderately to slightly weathered, medium to high strength sandstone						2.2							
	116	3												3		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 21 - View of side and end of Test Pit 311

Photo 22 - View of side of Test Pit 311

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D11
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 122.7 mAHD
COORDINATE E: 288986 **N:** 6236763
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 312
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	SAMPLE DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	122	0.0	TOPSOIL/(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular; with rootlets		TOP	F						E		0.0		
		0.2	(CI) Silty CLAY, with gravel; red brown and grey brown; clay fraction medium plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST	<PL							0.1		
												E		0.5		
		0.8	SHALE; grey brown and brown; with silty clay bands; Bringelly Shale					XW	0.8							
		1							1.05	VL		E		1.0		
									1.3	VL-L						
			1.5m: grey brown, dark grey and brown						1.5			E		1.5		
	121							HW-MW								
		2										E		2.0		
										L-M						
												E		2.5		
			2.7m: grey brown and dark grey						2.7							
	120	3						MW				E		3.0		
		3.4	Test pit discontinued at 3.40m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						3.4						DCP/150	5 10 15
	119															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 23 - View of side and end of Test Pit 312

Photo 24 - View of side of Test Pit 312

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D12
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 123.2 mAHD
COORDINATE E: 288940 **N:** 6236829
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 313
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	123	0.0	TOPSOIL/ (ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular; with rootlets		TOP	F						E		0.0		
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown mottled grey brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST	=PL							0.1		
		0.6	(CL-CI) Gravelly CLAY, with silt, trace sand; orange-brown, brown and grey; clay fraction low to medium plasticity; gravel fraction fine to medium, angular to sub-angular; sand fraction fine; appears to be shaly clay		XWM	ST	<PL - =PL					E		0.5	DCP/150	5 10 15
		1				VST - H						E		1.0		
	122	1.1	SHALE; red brown, brown and grey; with silty clay bands; Bringelly Shale						1.1	VL						
								XW - HW	1.3	VL-L		E		1.5		
		2	2.0m: grey brown, dark grey and grey					MW	2.0	L-M		E		2.0		
	121	2.3	Test pit discontinued at 2.30m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						2.3							
		3												3		
	120															

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 25 - View of side of Test Pit 313

Photo 26 - View of side and end of Test Pit 313

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D13
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 112.3 mAHD
COORDINATE E:289034 N: 6236897
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 314
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed		0.0	TOPSOIL/ (ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular; with rootlets		TOP	F - ST						E		0.0		
	112	0.3	(CI-CH) Silty CLAY, trace gravel; red brown and brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular to sub-rounded; trace rootlets trace decomposed organic matter		RES	ST	=PL					E		0.1		
														0.5	DCP/150	5 10 15
		1.0	(CI) Silty CLAY, with gravel; red brown; clay fraction medium plasticity; gravel fraction fine to medium, angular to sub-angular; trace rootlets			VST						E		1.0		
	111					VST - H										
			1.8m: red brown and grey		RES							E		1.5		
							<PL									
		2										E		2.0	PP	460-560
	110					H										
		2.4	(CL) Gravelly CLAY, with silt, trace sand; red-brown, brown and grey; clay fraction low plasticity; gravel fraction fine to coarse, angular to sub-angular; sand fraction fine; with bands of low to medium strength sandstone, appears to be shaly clay		XWM							E		2.5		
		2.7	Test pit discontinued at 2.70m depth Limit of investigation. Refusal on moderately to slightly weathered, medium to high strength sandstone													
	109	3												3		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 27 - View of side of Test Pit 314

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D14
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 105.3 mAHD
COORDINATE E: 288914 **N:** 6237110
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 315
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	105	0.0	TOPSOIL/(CL) Silty CLAY; dark brown; low plasticity; with rootlets		TOP	F						E		0.0	DCP/150	5 10 15
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown and pale brown; clay fraction medium to high plasticity; gravel fraction fine to medium, sub-angular; trace rootlets		RES	ST						E		0.1		
	104	0.7	(CI-CH) Silty CLAY, trace gravel; red brown mottled pale grey; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST - VST	=PL					E		0.5		
		1										E		1.0		
		1.5	(CL) Gravelly CLAY, with silt; red-brown, brown and pale grey; clay fraction low plasticity; gravel fraction fine to medium, angular to sub-angular; appears to be shaly clay		XWM	VST	<PL					E		1.5		
	103	2										E		2.0		
		2.3	SHALE; red brown, brown and grey; with silty clay bands; Bringelly Shale					XW-HW	2.3	VL-L		E		2.5		
		3										E		3.0		
	102	3.1	Test pit discontinued at 3.10m depth Limit of investigation. Terminated in very low to low strength shale						3.1							

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 28 - View of side of Test Pit 315

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D15
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 100.8 mAHD
COORDINATE E: 289195 **N:** 6237113
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 316
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	100	0.0	TOPSOIL/(ML) Clayey SILT, with gravel, trace sand; dark brown; silt fraction low plasticity; gravel fraction fine to medium, sub-angular to sub-rounded; sand fraction fine; with rootlets		TOP	F	<PL					E		0.0		
		0.3	(CI-CH) Silty CLAY, trace gravel; red brown and pale brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular to sub-rounded; trace rootlets and decomposed organic matter		RES	ST - VST	=PL							0.1		
		1										E		0.5	DCP/150	
		1.5	(CI-CH) Silty CLAY, trace gravel; red brown mottled pale grey; clay fraction medium to high plasticity; gravel fraction fine, sub-angular to sub-rounded; trace rootlets and decomposed organic matter									E		1.0		
	99	2	2.2m: with fine to medium, sub-angular to angular ironstone and shale gravel and clayey silt bands		RES	VST	<PL to =PL					E		1.5	PP	220-260
		2.7	(CI-CH) Gravelly CLAY; pale grey mottled red-brown; fine to medium, angular to sub-angular, medium to high plasticity; shale gravel and clayey silt bands		XWM							E		2.0		
	98	3										E		2.5	PP	210-290
		3.3	Test pit discontinued at 3.30m depth Limit of investigation. Terminated in very stiff, extremely weathered shale									E		3.0		
	97															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
OPERATOR: WC
LOGGED: DN

METHOD: 450 mm toothed bucket

REMARKS: Grass cover at the surface. Topsoil layer appears disturbed by past farming activity

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Photo 29 - View of side of Test Pit 316

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D16
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 96.4 mAHD
COORDINATE E: 289479 **N:** 6237111
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 317
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
moderate seepage	96	0.0	TOPSOIL/ (ML) Clayey SILT; dark brown; low plasticity; trace rootlets		TOP	F						E		0.0	DCP/150	5 10 15
		0.3	(Cl) Silty CLAY, trace gravel; red brown and brown; clay fraction medium plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST								0.1		
		0.6	(Cl) Silty CLAY, with gravel; brown and brown grey; clay fraction medium plasticity; gravel fraction fine to medium, angular to sub-angular		RES	VST	<PL					E		0.5		
	95	1												1.0		
		1.6	(CL-Cl) Gravelly Silty CLAY, trace sand; brown, orange brown and dark grey; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular to sub-angular; sand fraction fine		XWM	VST - H	=PL					E		1.5		
	94	2												2.0		
							=PL - >PL					E		2.5		
∇ 2.6 m depth, 17/11/22, Groundwater seepage	93	3.0	Test pit discontinued at 3.00m depth Limit of investigation. Terminated in very stiff to hard, extremely weathered shale									E		3.0		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 30 - View of side of Test Pit 317

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D17
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 98.8 mAHD
COORDINATE E: 289641 **N:** 6237095
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 318
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	TESTING DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
17/11/22, No free groundwater observed	98	0.0	TOPSOIL/(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction fine, sub-angular; with roots		TOP	S - F						E		0.0	DCP/150	5 10 15
		0.3	(CI-CH) Silty CLAY, trace gravel; red brown and brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST	=PL					E		0.1		
		0.6	(CI-CH) Silty CLAY, trace gravel; red brown mottled pale grey; clay fraction medium to high plasticity; gravel fraction fine to medium, angular to sub-angular		RES	VST								0.5		
	97	1										E		1.0		
		1.1	(CL-CI) Gravelly Silty CLAY; red brown mottled pale grey; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular to sub-angular; iron-cemented in parts, appears to be shaly day		XWM	VST H	<PL					E		1.5		
		2.0	SHALE; red brown and pale grey; with silty clay bands; Bringelly Shale					XW-HW	2.0	VL-L		E		2.0		
	96								2.4			E		2.5		
								HW-MW		L-M						
		3	3.0m: grey brown, grey and red brown					MW	3.0			E		3.0		
	95	3.2	Test pit discontinued at 3.20m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						3.2							

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

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Photo 31 - View of side and end of Test Pit 318 (oblique view)

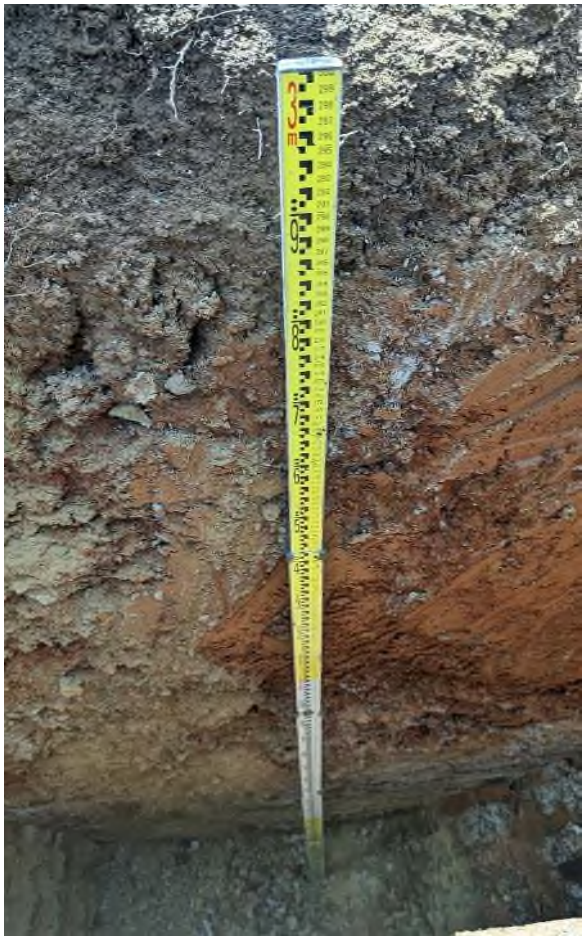

Photo 32 - View of side of Test Pit 318

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D18
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 102.9 mAHD
COORDINATE E: 289464 **N:** 6236699
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 319
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
moderate seepage	102	0.0	TOPSOIL/(ML) Clayey SILT, trace gravel; dark brown; silt fraction low plasticity; gravel fraction sub-angular; with rootlets		TOP	F						E		0.0		
		0.3	(CI-CH) Silty CLAY, trace gravel; red brown and brown; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; with rootlets		RES	F - ST								0.1		
		0.6	(CI) Silty CLAY, with gravel; brown and grey brown; clay fraction medium plasticity; gravel fraction fine to medium, angular		RES	ST	=PL					E		0.5	DCP/150	5 10 15
	101	1.8	(CL-CI) Gravelly Silty CLAY; orange brown, brown and grey; clay fraction low to medium plasticity; gravel fraction fine to medium, angular to sub-angular		XWM	ST - VST	=PL - >PL					E		1.0		
												E		1.5	PP	130-180
												E		2.0		
		2.6	SHALE; grey brown and grey; Bringelly Shale					HW	2.6	L-M		E		2.5		
	100	2.9	Test pit discontinued at 2.90m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						2.9			E		2.9		
		3												3		
	99															

2.5 m depth, 17/11/22 Groundwater seepage

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NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

Photo 33 - View of side and end of Test Pit 319 (oblique view)

Photo 34 - View of side of Test Pit 319

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D19
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 107.2 mAHD
COORDINATE E: 289297 **N:** 6236836
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 320
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	SAMPLE DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	107	0.0	TOPSOIL/(ML) Clayey SILT, with gravel; dark brown; silt fraction low plasticity; gravel fraction fine to medium, sub-angular; with rootlets		TOP	F - ST						E		0.0	DCP/150	5 10 15
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown and brown; clay fraction medium to high plasticity; gravel fraction fine to medium, sub-angular to sub-rounded; trace rootlets and decomposed organic material		RES	ST	=PL							0.1		
		0.7	(CI-CH) Silty CLAY, with gravel; red brown mottled grey and brown; clay fraction medium to high plasticity; gravel fraction fine to medium, angular and sub-rounded; trace rootlets		RES							E		0.5		
	106	1										E		1.0		
		1.1	(CL-CI) Gravelly CLAY, with silt; red brown and pale grey; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular to sub-angular; appears to be shaly clay		XWM	ST - VST	<PL									
		1.6	SHALE; pale grey and red brown; Bringelly Shale					XW	1.6	VL		E		1.5		
	105	2	2.2m: brown, red brown and pale grey					HW	2.2	VL-L		E		2.0		
												E		2.5		
	104	3.0	Test pit discontinued at 3.00m depth Limit of investigation. Terminated in very low to low strength shale						3.0			E		3.0		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

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PLANT: JCB 4CX 8t Backhoe
OPERATOR: WC
LOGGED: DN

METHOD: 450 mm toothed bucket

REMARKS: Grass cover at the surface

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

Photo 35 - View of side of Test Pit 320

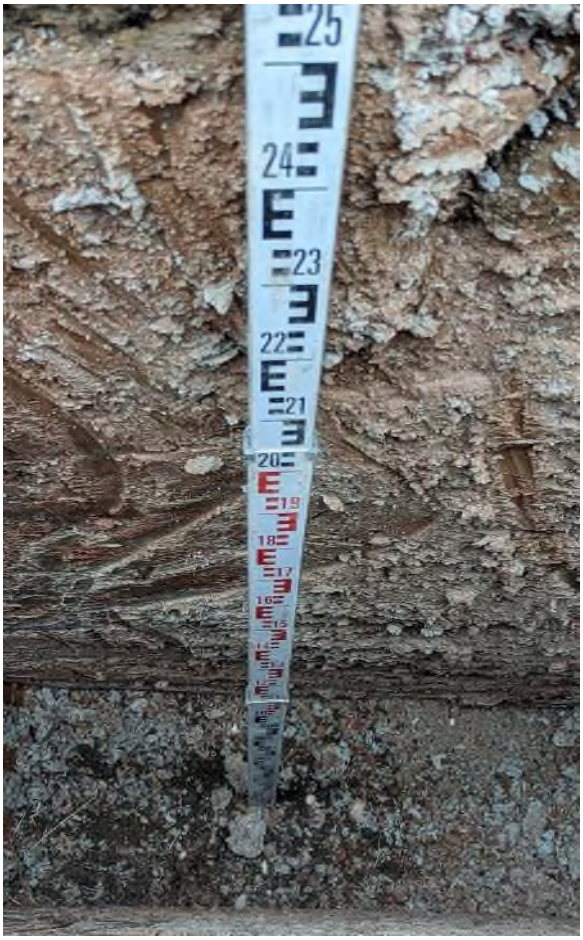

Photo 36 - View of side of Test Pit 320

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT: 92225.06
	Proposed Residential Subdivision	PLATE No: D20
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV: A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE: Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 125.1 mAHD
COORDINATE E: 289118 **N:** 6236706
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 321
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed	125	0.0	TOPSOIL/(ML) Clayey SILT; dark brown; low plasticity; with rootlets		TOP	F						E		0.0	DCP/150	5 10 15
		0.15	(CI-CH) Silty CLAY, trace gravel; red brown and pale grey; clay fraction medium to high plasticity; gravel fraction fine, sub-angular; trace rootlets		RES	ST	<PL							0.1		
		0.6	(CL-CI) Gravelly CLAY, with silt; orange brown and grey brown; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular to sub-angular; appears to be shaly clay		XWM	VST TO H						E		0.5		
	124	1												1.0		
		1.1	SHALE; pale grey, brown and brown grey; with bands of low to medium strength sandstone; Bringelly Shale					HW	1.1	VL-L		E		1.5		
			1.7m: pale grey and brown					MW	1.7	L-M						
		2.0	Test pit discontinued at 2.00m depth Limit of investigation. Refusal on moderately to slightly weathered, medium to high strength sandstone						2.0			E		2.0		
	123															
		3												3		
	122															

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

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Photo 37 - View of side and end of Test Pit 321 (oblique view)

Photo 38 - View of side of Test Pit 321

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D21
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 112.4 mAHD
COORDINATE E: 289177 **N:** 6236448
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 322
PROJECT No: 92225.06
DATE: 16/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	TESTING DEPTH (m)	TEST TYPE	TESTING RESULTS AND REMARKS
16/11/22, No free groundwater observed		0.0	TOPSOIL/(CL-CI) Silty CLAY; dark brown; low to medium plasticity; with rootlets		TOP		<PL					E		0.0	DCP/150	5 10 15
		0.2	(CI-CH) Silty CLAY, trace gravel; red brown mottled brown grey; clay fraction medium to high plasticity; gravel fraction fine, angular to sub-angular; trace rootlets		RES	ST	=PL					E		0.1		
	112													0.5		
		0.8	(CI-CH) Silty CLAY, with gravel; pale grey mottled red brown; clay fraction medium to high plasticity; gravel fraction fine to medium, angular to sub-angular		RES	VST						E		1.0		
		1.2	SHALE; pale grey and grey brown; with silty clay bands; Bringelly Shale					HW	1.2	VL-L						
	111													2.0		
		2	2.1-2.6m: pale grey, extremely weathered, very low strength zone					XW	2.1	VL		E		2.5		
	110							HW-MW	2.6	L-M						
		3										E		3.0		
		3.1	Test pit discontinued at 3.10m depth Limit of investigation. Refusal on moderately weathered, medium strength shale						3.1							
	109															

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
METHOD: 450 mm toothed bucket
REMARKS: Grass cover at the surface

OPERATOR: WC
LOGGED: DN

EXPORTED 14/02/23 11:24. TEMPLATE ID: DP_104.02.00_TESTPIT_ROCK

Photo 39 - View of end of Test Pit 322

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D22
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

Photo 40 - View of side of Test Pit 322

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D23
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

TEST PIT LOG

CLIENT: Boyuan Bringelly Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: South Creek West, Precinct 5, Cobbitty Lot 500 DP1231858

SURFACE LEVEL: 112 mAHD
COORDINATE E: 289487 **N:** 6236442
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 323
PROJECT No: 92225.06
DATE: 17/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
17/11/22, No free groundwater observed		0.0	TOPSOIL/ (ML) Clayey SILT, trace gravel; brown; silt fraction low plasticity; gravel fraction sub-angular to sub-rounded; with rootlets		TOP	F	<PL					E		0.0		
		0.3	(CI-CH) Silty CLAY, trace gravel; red brown and grey brown; clay fraction medium to high plasticity; gravel fraction sub-angular; trace rootlets and decomposed organic matter		RES	ST - VST	=PL					E		0.1		
		0.8	(CL-CI) Silty CLAY, with gravel; grey brown and brown; clay fraction low to medium plasticity; gravel fraction fine, sub-angular to sub-rounded; trace rootlets											0.5	DCP/150	5 10 15
	111	1				VST - H						E		1.0		
					RES		<PL							1.5		
	110	2	2.0m: with fine to medium grained sub-rounded to sub-angular gravel, trace fine grained sand									E		2.0	PP	>600
						H								2.5		
		2.7	(CL-CI) Gravelly CLAY, with silt; pale grey; clay fraction low to medium plasticity; gravel fraction fine to coarse, angular to sub-angular; with fine grained sandstone bands, appears shaly clay		XWM											
	109	3.0	Test pit discontinued at 3.00m depth Limit of investigation. Terminated in hard, extremely weathered shale									E		3.0		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: JCB 4CX 8t Backhoe
OPERATOR: WC
LOGGED: DN

METHOD: 450 mm toothed bucket

REMARKS: Grass cover at the surface. Topsoil layer appears disturbed by past farming activity

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Photo 41 - View of end of Test Pit 323

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D24
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

Photo 42 - View of side of Test Pit 323

Douglas Partners Geotechnics / Environment / Groundwater	Test Pit Photographs	PROJECT:	92225.06
	Proposed Residential Subdivision	PLATE No:	D25
	SCW, Cobbitty Bringelly Precinct, Cobbitty	REV:	A
	CLIENT: Boyuan Bringelly Pty Ltd	DATE:	Feb-23

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

The soil group symbol classifications are given as follows based on two major soil divisions:

- Coarse-grained soils
- Fine-grained soils

Major Divisions				Description	
				Group Symbol*	Typical Name
COARSE-GRAINED SOILS	More than 65% by dry mass, (excluding that larger than 63 mm) is greater than 0.075 mm	GRAVEL	More than 50% of coarse grains are greater than 2.36 mm	GW	Well graded gravels and gravel-sand mixtures, little or no fines.
				GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
		GRAVELLY SOILS		GM	Silty gravels, gravel-sand-silt mixtures.
				GC	Clay gravels, gravel-sand-clay mixtures.
		SAND	More than 50% of coarse grains are less than 2.36 mm	SW	Well graded sands and gravelly sands, little or no fines.
				SP	Poorly graded sands and gravelly sands, little or no fines.
		SANDY SOILS		SM	Silty sand, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures.

* For coarse grained soils where the fines content is between 5% and 12%, the soil shall be given a dual classification eg GP-GM.

FINE-GRAINED SOILS	More than 35% by dry mass, (excluding that larger than 63 mm) is less than 0.075 mm	Liquid Limit less than 35%	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity
		35% <LL< 50%	CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Liquid Limit greater than 50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
			Pt	Peat muck and other highly organic soils.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- 'Moist, dry of plastic limit' or 'w <PL' (i.e. hard and friable or powdery).
- 'Moist, near plastic limit' or 'w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- 'Moist, wet of plastic limit' or 'w >PL' (i.e. soils usually weakened and free water forms on the hands when handling).
- 'Wet' or 'w ≈LL' (i.e. near the liquid limit).
- 'Wet' or 'w >LL' (i.e. wet of the liquid limit).

Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

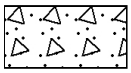
Symbols & Abbreviations

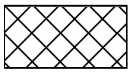
Graphic Symbols for Soil and Rock

General


Asphalt

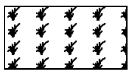

Road base

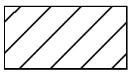

Concrete

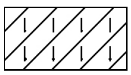

Filling

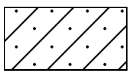
Soils


Topsoil

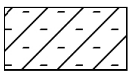

Peat

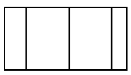

Clay

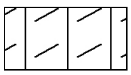

Silty clay

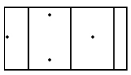

Sandy clay

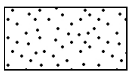

Gravelly clay

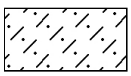

Shaly clay

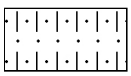

Silt


Clayey silt


Sandy silt

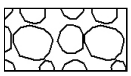

Sand

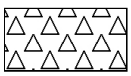

Clayey sand


Silty sand


Gravel

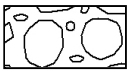

Sandy gravel


Cobbles, boulders

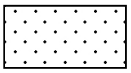

Talus

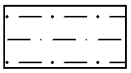
Sedimentary Rocks

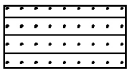

Boulder conglomerate

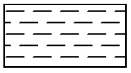

Conglomerate


Conglomeratic sandstone

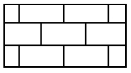

Sandstone


Siltstone

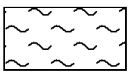

Laminite

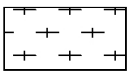

Mudstone, claystone, shale


Coal


Limestone

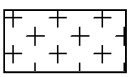
Metamorphic Rocks

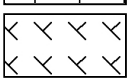

Slate, phyllite, schist

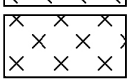

Gneiss

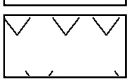

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix E

Laboratory Analytical Reports

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 236141

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	Erin Leslie
Address	18 Waler Crescent, Smeaton Grange, NSW, 2567

Sample Details

Your Reference	**92225.03, Cobbitty, SWP, Prelim Salinity Assess**
Number of Samples	20 Soil
Date samples received	06/02/2020
Date completed instructions received	06/02/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

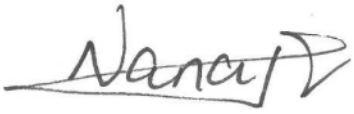
Date results requested by	13/02/2020
Date of Issue	13/02/2020

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Loren Bardwell, Senior Chemist
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		236141-1	236141-2	236141-3	236141-4	236141-5
Your Reference	UNITS	TP101	TP101	TP103	TP103	TP109
Depth		0.5	1.5	0.5	1.5	0.5
Date Sampled		03/02/2020	03/02/2020	03/02/2020	03/02/2020	03/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Chloride, Cl 1:5 soil:water	mg/kg	51	670	63	300	1,300
Sulphate, SO4 1:5 soil:water	mg/kg	20	230	47	160	130

Misc Inorg - Soil						
Our Reference		236141-6	236141-7	236141-8	236141-9	236141-10
Your Reference	UNITS	TP109	TP109	TP111	TP111	TP112
Depth		1.5	2.5	1.5	2.5	0.5
Date Sampled		03/02/2020	03/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Chloride, Cl 1:5 soil:water	mg/kg	1,200	740	400	1,200	310
Sulphate, SO4 1:5 soil:water	mg/kg	82	74	99	250	180

Misc Inorg - Soil						
Our Reference		236141-11	236141-12	236141-13	236141-14	236141-15
Your Reference	UNITS	TP112	TP112	TP113	TP113	TP113
Depth		1.5	2.5	0.5	1.5	2.5
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Chloride, Cl 1:5 soil:water	mg/kg	520	750	48	890	910
Sulphate, SO4 1:5 soil:water	mg/kg	140	200	10	330	300

Misc Inorg - Soil						
Our Reference		236141-16	236141-17	236141-18	236141-19	236141-20
Your Reference	UNITS	TP115	TP115	TP115	TP119	TP119
Depth		0.5	1.5	2.5	0.5	1.5
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Chloride, Cl 1:5 soil:water	mg/kg	40	520	450	36	290
Sulphate, SO4 1:5 soil:water	mg/kg	<10	21	22	10	160

ESP/CEC						
Our Reference		236141-1	236141-2	236141-3	236141-4	236141-5
Your Reference	UNITS	TP101	TP101	TP103	TP103	TP109
Depth		0.5	1.5	0.5	1.5	0.5
Date Sampled		03/02/2020	03/02/2020	03/02/2020	03/02/2020	03/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Exchangeable Ca	meq/100g	4.3	1.0	1.1	0.1	1.4
Exchangeable K	meq/100g	0.2	0.1	<0.1	0.1	0.6
Exchangeable Mg	meq/100g	6.4	7.4	7.7	7.1	8.2
Exchangeable Na	meq/100g	0.80	2.0	1.1	2.6	1.2
Cation Exchange Capacity	meq/100g	12	11	9.9	9.9	11
ESP	%	7	19	11	26	10

ESP/CEC						
Our Reference		236141-6	236141-7	236141-8	236141-9	236141-10
Your Reference	UNITS	TP109	TP109	TP111	TP111	TP112
Depth		1.5	2.5	1.5	2.5	0.5
Date Sampled		03/02/2020	03/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Exchangeable Ca	meq/100g	<0.1	0.2	0.8	0.1	0.4
Exchangeable K	meq/100g	<0.1	<0.1	<0.1	<0.1	0.1
Exchangeable Mg	meq/100g	8.2	16	9.2	9.8	7.2
Exchangeable Na	meq/100g	2.9	8.3	5.6	8.0	1.4
Cation Exchange Capacity	meq/100g	11	24	16	18	9.2
ESP	%	26	34	36	45	15

ESP/CEC						
Our Reference		236141-11	236141-12	236141-13	236141-14	236141-15
Your Reference	UNITS	TP112	TP112	TP113	TP113	TP113
Depth		1.5	2.5	0.5	1.5	2.5
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Exchangeable Ca	meq/100g	<0.1	<0.1	7.4	3.3	0.6
Exchangeable K	meq/100g	<0.1	0.1	0.1	<0.1	0.2
Exchangeable Mg	meq/100g	6.1	11	9.5	10	10
Exchangeable Na	meq/100g	2.2	4.9	1.3	4.0	3.8
Cation Exchange Capacity	meq/100g	8.5	16	18	17	15
ESP	%	26	30	7	23	25

ESP/CEC						
Our Reference		236141-16	236141-17	236141-18	236141-19	236141-20
Your Reference	UNITS	TP115	TP115	TP115	TP119	TP119
Depth		0.5	1.5	2.5	0.5	1.5
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Exchangeable Ca	meq/100g	10	7.5	3.6	6.5	0.7
Exchangeable K	meq/100g	0.4	0.1	<0.1	0.2	0.2
Exchangeable Mg	meq/100g	7.9	16	14	13	13
Exchangeable Na	meq/100g	0.67	3.8	3.5	1.6	3.2
Cation Exchange Capacity	meq/100g	19	27	21	21	17
ESP	%	3	14	16	7	19

Method ID	Methodology Summary
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	236141-3
Date prepared	-			10/02/2020	1	10/02/2020	10/02/2020		10/02/2020	10/02/2020
Date analysed	-			10/02/2020	1	10/02/2020	10/02/2020		10/02/2020	10/02/2020
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	51	71	33	96	75
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	20	24	18	99	102

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	16	10/02/2020	10/02/2020		[NT]	[NT]
Date analysed	-			[NT]	16	10/02/2020	10/02/2020		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	16	40	34	16	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	16	<10	<10	0	[NT]	[NT]

QUALITY CONTROL: ESP/CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			10/02/2020	1	10/02/2020	10/02/2020		10/02/2020	[NT]
Date analysed	-			10/02/2020	1	10/02/2020	10/02/2020		10/02/2020	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	1	4.3	4.4	2	109	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	1	0.2	0.2	0	104	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	1	6.4	6.0	6	103	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	1	0.80	0.70	13	102	[NT]
ESP	%	1	Metals-009	[NT]	1	7	6	15	[NT]	[NT]

QUALITY CONTROL: ESP/CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	10/02/2020	10/02/2020		[NT]	[NT]
Date analysed	-			[NT]	11	10/02/2020	10/02/2020		[NT]	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	[NT]	11	6.1	5.7	7	[NT]	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	[NT]	11	2.2	2.1	5	[NT]	[NT]
ESP	%	1	Metals-009	[NT]	11	26	27	4	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Samples received in good order: 22.6

[redacted]glas Partners
...otechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	92225.03	**Suburb:**	South Creek West, Cobbit	**To:**	Envirolab
Project Name:	COBBITTY, SWP, Prelim Salinity Asses	**Order Number**			12 Ashley St, Chatswood NSW 2067
Project Manager:	Chris Kline	**Sampler:**	E Leslie	**Attn:**	Tania Notaras
Emails:	Erin.Leslie@douglaspartners.com.au			**Phone:**	(02) 9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☐			**Email:**	tnotaras@envirolabservices.com.au
Prior Storage:	☐ Esky ☐ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: Chlorides & sulphites	Analytes: CEC & SEP	Analytes	Analytes	Analytes	Analytes	Analytes	Analytes	Analytes	Notes/preservation
TP101/0.5	1	02/03/20	S	G	X	X								
TP101/1.5	2	02/03/20	S	G	X	X								
TP103/0.5	3	02/03/20	S	G	X	X								
TP103/1.5	4	02/03/20	S	G	X	X								
TP109/0.5	5	02/03/20	S	G	X	X								
TP109/1.5	6	02/03/20	S	G	X	X								
TP109/2.5	7	02/03/20	S	G	X	X								
TP111/1.5	8	02/04/20	S	G	X	X								
TP111/2.5	9	02/04/20	S	G	X	X								
TP112/0.5	10	02/04/20	S	G	X	X								
TP112/1.5	11	02/04/20	S	G	X	X								
TP112/2.5	12	02/04/20	S	G	X	X								
TP113/0.5	13	02/04/20	S	G	X	X								
TP113/1.5	14	02/04/20	S	G	X	X								
TP113/2.5	15	02/04/20	S	G	X	X								
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 236141
Date Received: 6/2/20
Time Received: 1352
Received by: SD
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Lab Report/Reference No: 236141

Metals to Analyse: 8HM unless specified here:

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: **Received by:** Jason Day EIS SYD **Date & Time:** 6/2/20 1352

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	92225.03	**Suburb:**	South Creek West, Cobbit	**To:**	Envirolab
Project Name:	COBBITTY, SWP, Prelim Salinity Asses	**Order Number**			12 Ashley St, Chatswood NSW 2067
Project Manager:	Chris Kline	**Sampler:**	E Leslie	**Attn:**	Tania Notaras
Emails:	Erin.Leslie@douglaspartners.com.au			**Phone:**	(02) 9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☐			**Email:**	tnotaras@envirolabservices.com.au
Prior Storage:	☐ Esky ☐ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Lab ID	Sampling Date	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: Chlorides & sulphites	Analytes: CEC & SEP	Analytes	Analytes	Analytes	Analytes	Analytes	Analytes	Analytes	Notes/preservation
TP115/0.5	16	02/04/20	S	G	X	X								
TP115/1.5	17	02/04/20	S	G	X	X								
TP115/2.5	18	02/04/20	S	G	X	X								
TP119/0.5	19	02/04/20	S	G	X	X								
TP119/1.5	20	02/04/20	S	G	X	X								
PQL (S) mg/kg												**ANZECC PQLs req'd for all water analytes** ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 236141

Total number of samples in container:

Relinquished by:

Transported to laboratory by:

Send Results to: Douglas Partners Pty Ltd

Address:

Phone:

Fax:

Signed:

Received by: Jason Day GCS SYD 3PM

Date & Time: 6/2/20 1382

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	Erin Leslie

Sample Login Details

Your reference	92225.03, Cobbitty, SWP, Prelim Salinity Assess
Envirolab Reference	236141
Date Sample Received	06/02/2020
Date Instructions Received	06/02/2020
Date Results Expected to be Reported	13/02/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	20 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	22.6
Cooling Method	None
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	Misc Inorg - Soil	ESP/CEC
TP101-0.5	✓	✓
TP101-1.5	✓	✓
TP103-0.5	✓	✓
TP103-1.5	✓	✓
TP109-0.5	✓	✓
TP109-1.5	✓	✓
TP109-2.5	✓	✓
TP111-1.5	✓	✓
TP111-2.5	✓	✓
TP112-0.5	✓	✓
TP112-1.5	✓	✓
TP112-2.5	✓	✓
TP113-0.5	✓	✓
TP113-1.5	✓	✓
TP113-2.5	✓	✓
TP115-0.5	✓	✓
TP115-1.5	✓	✓
TP115-2.5	✓	✓
TP119-0.5	✓	✓
TP119-1.5	✓	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info
Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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Approved Signatory: Meragal Henaka Arachchi
clean lab

NATA Accredited Laboratory Number: 828

Report Number: **92225.02-1**
Issue Number: 1
Date Issued: 11/03/2020
Client: Cyan Stone Bringelly (Aus) Pty Ltd
Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198A
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 05/03/2020
Sample Location: **TP101 (1.5m)**
Material: Silty CLAY : grey and red brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Contact:	Adam Carmody
Project Number:	92225.02
Project Name:	Proposed Rezoning
Project Location:	621 - 705 The Northern Road, Cobbitty
Work Request:	2198
Sample Number:	MA-2198B
Date Sampled:	05/02/2020
Dates Tested:	28/02/2020 - 05/03/2020
Sample Location:	**TP102 (0.5m)**
Material:	Silty CLAY: red brown silty clay

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198C
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 11/03/2020
Sample Location: **TP103 (0.5 m)**
Material: Silty CLAY - brown silty clay

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	22		

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Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198D
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 06/03/2020
Sample Location: **TP103 (1.5m)**
Material: SANDSTONE- fine grained, grey

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	35		
Plastic Limit (%)	17		
Plasticity Index (%)	**18**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Linear Shrinkage (%)	9.0		
Cracking Crumbling Curling	None		

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Contact:	Adam Carmody
Project Number:	92225.02
Project Name:	Proposed Rezoning
Project Location:	621 - 705 The Northern Road, Cobbitty
Work Request:	2198
Sample Number:	MA-2198E
Date Sampled:	05/02/2020
Dates Tested:	28/02/2020 - 03/03/2020
Sample Location:	**TP104 (0.5m)**
Material:	Silty CLAY : red brown and grey mottled

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**6**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198F
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sample Location: **TP105 (0.5m)**
Material: Silty CLAY: red brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**6**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198G
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sample Location: **TP106 (0.5m)**
Material: Silty CLAY : brown and red brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198H
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 06/03/2020
Sample Location: **TP107 (0.5m)**
Material: Silty CLAY : red brown and grey mottled silty clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	74		
Plastic Limit (%)	21		
Plasticity Index (%)	**53**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	Curling		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198J
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **TP109 (0.5m)**
Material: Silty CLAY: brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	22		

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Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198K
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 09/03/2020
Sample Location: **TP110 (1.5m)**
Material: Silty CLAY: pale gre silty clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	67		
Plastic Limit (%)	19		
Plasticity Index (%)	**48**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Linear Shrinkage (%)	13.5		
Cracking Crumbling Curling	Curling		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	22		

Material Test Report

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Client:	Cyan Stone Bringelly (Aus) Pty Ltd Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact:	Adam Carmody
Project Number:	92225.02
Project Name:	Proposed Rezoning
Project Location:	621 - 705 The Northern Road, Cobbitty
Work Request:	2198
Sample Number:	MA-2198L
Date Sampled:	05/02/2020
Dates Tested:	28/02/2020 - 03/03/2020
Sample Location:	**TP111 (1.5m)**
Material:	Silty CLAY : orange brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	22		

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Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198M
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sample Location: **TP112 (1.5m)**
Material: Silty CLAY red brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	22		

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Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198N
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **TP113 (1.5m)**
Material: Silty CLAY : orange brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	22		

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Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198O
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sample Location: **TP115 (0.5m)**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198P
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sample Location: **TP115 (1.5m)**
Material: Silty CLAY : brown and grey

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	50		
Plastic Limit (%)	17		
Plasticity Index (%)	**33**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Linear Shrinkage (%)	13.5		
Cracking Crumbling Curling	None		

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Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198R
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 09/03/2020
Sample Location: **TP108 (0.5 - 0.9m)**
Material: FILL/Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	39		
Plastic Limit (%)	19		
Plasticity Index (%)	**20**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Linear Shrinkage (%)	9.0		
Cracking Crumbling Curling	None		

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Contact:	Adam Carmody
Project Number:	92225.02
Project Name:	Proposed Rezoning
Project Location:	621 - 705 The Northern Road, Cobbitty
Work Request:	2198
Sample Number:	MA-2198T
Date Sampled:	05/02/2020
Dates Tested:	28/02/2020 - 09/03/2020
Sample Location:	**TP117 (0.5 - 0.9m)**
Material:	Silty CLAY : orange brown silty clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	75		
Plastic Limit (%)	22		
Plasticity Index (%)	**53**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Linear Shrinkage (%)	14.0		
Cracking Crumbling Curling	Curling		

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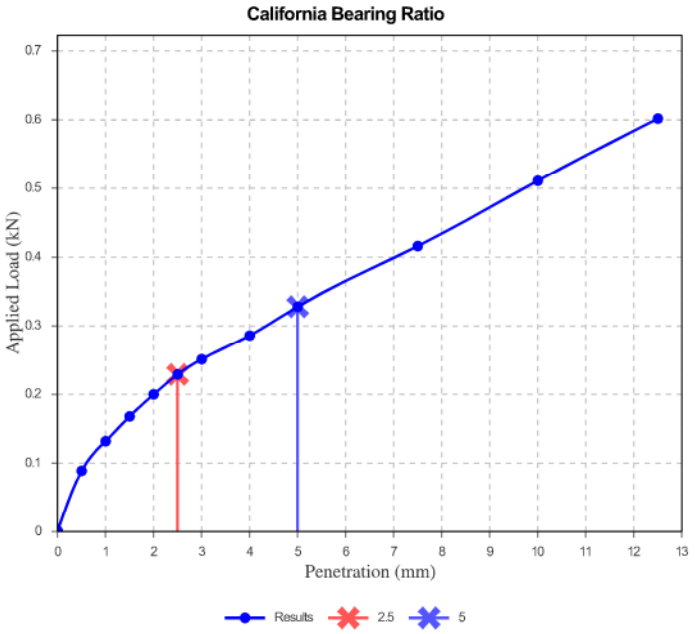
Project Number:	92225.02
Project Name:	Proposed Rezoning
Project Location:	621 - 705 The Northern Road, Cobbitty
Work Request:	2198
Sample Number:	MA-2198U
Date Sampled:	05/02/2020
Dates Tested:	28/02/2020 - 10/03/2020
Sample Location:	**TP102 (1.0m)**
Material:	Silty Clay - hard red-brown trace gravels (including ironstone) and sands

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**1.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	2.00		
Optimum Moisture Content (%)	13.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Moisture Content at Placement (%)	12.9		
Moisture Content Top 30mm (%)	14.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	96		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)			



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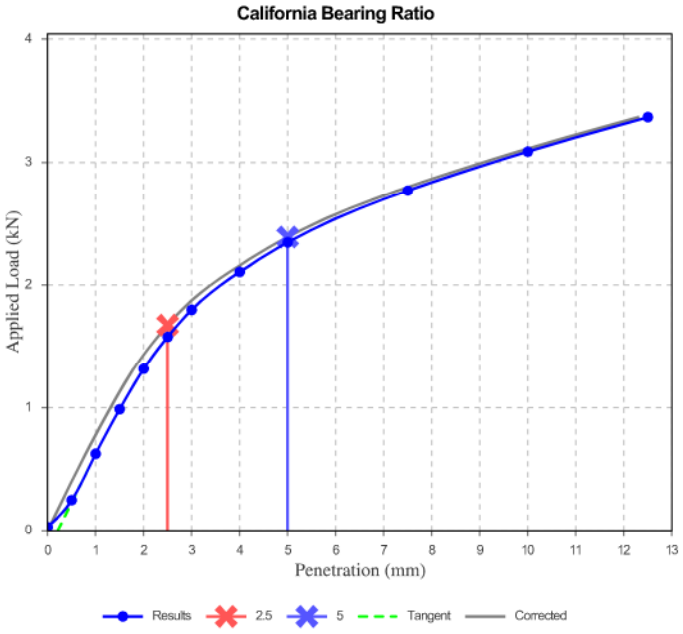
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198V
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 10/03/2020
Sample Location: **TP105 (0.5m)**
Material: silty CLAY - hard red-brown with trace gravels and sands

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**13**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.81		
Optimum Moisture Content (%)	14.5		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	100.0		
Moisture Content at Placement (%)	14.7		
Moisture Content Top 30mm (%)	22.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	96		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)			



Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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Fax: (02) 4646 1886
Email: meregal.henakaa@douglaspartners.com.au

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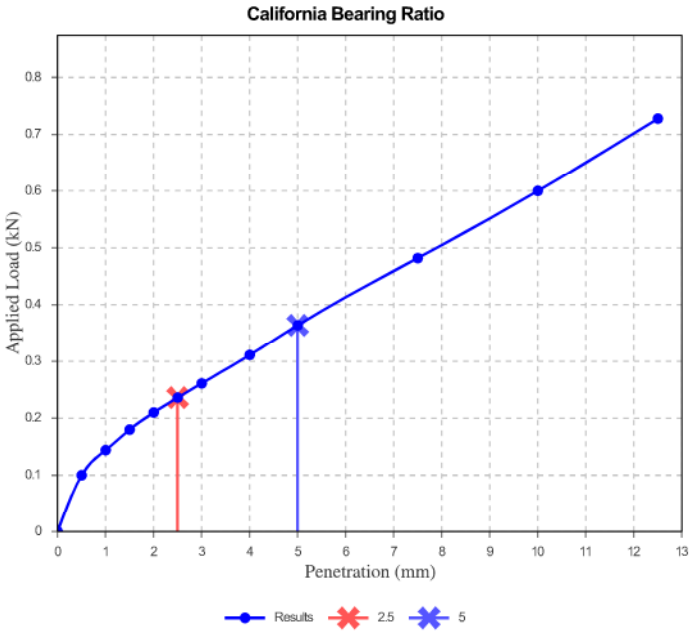
[redacted]

Approved Signatory: Meragal Henaka Arachchi
clean lab

NATA Accredited Laboratory Number: 828

Report Number: **92225.02-1**
Issue Number: 1
Date Issued: 11/03/2020
Client: Cyan Stone Bringelly (Aus) Pty Ltd
Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198W
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 10/03/2020
Sample Location: **TP111 (1.0m)**
Material: silty CLAY - Orange-brown with trace gravels (ironstone and siltstone)

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**2.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.94		
Optimum Moisture Content (%)	13.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Moisture Content at Placement (%)	13.3		
Moisture Content Top 30mm (%)	21.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	96		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)			



Material Test Report

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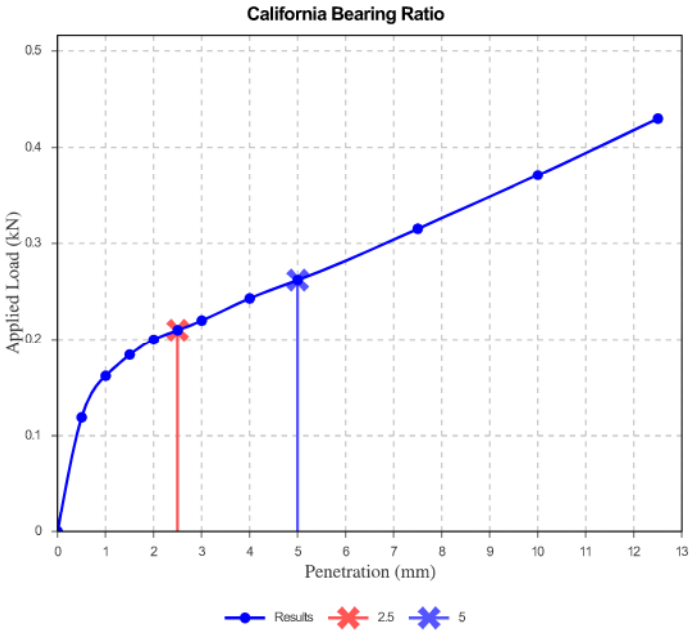
clean lab
NATA Accredited Laboratory Number: 828

Report Number:	**92225.02-1**
Issue Number:	1
Date Issued:	11/03/2020
Client:	Cyan Stone Bringelly (Aus) Pty Ltd Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact:	Adam Carmody
Project Number:	92225.02
Project Name:	Proposed Rezoning
Project Location:	621 - 705 The Northern Road, Cobbitty
Work Request:	2198
Sample Number:	MA-2198X
Date Sampled:	05/02/2020
Dates Tested:	28/02/2020 - 10/03/2020
Sample Location:	**TP116 (0.5m)**
Material:	silty CLAY - Orange-bown (slight mottle) with angular gravels (siltstone). Coluvium.

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**1.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.80		
Optimum Moisture Content (%)	15.5		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	100.5		
Moisture Content at Placement (%)	15.8		
Moisture Content Top 30mm (%)	28.3		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	96		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)			



Material Test Report

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NATA Accredited Laboratory Number: 828

Report Number: **92225.02-1**
Issue Number: 1
Date Issued: 11/03/2020
Client: Cyan Stone Bringelly (Aus) Pty Ltd
Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Sample Number: MA-2198BZ
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020
Sampling Method: Sampled by Client
The results apply to the sample as received
Sample Location: **TP108 (0.5 m)**
Material: FILL/Silty CLAY

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	22		

Material Test Report

Report Number: 92225.02-1
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Date Issued: 11/03/2020
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Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 28/02/2020

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Approved Signatory: Meragal Henaka Arachchi
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NATA Accredited Laboratory Number: 828

Determination of EC of Soil (In-House) DP MAC2

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-2198Y	TP101	0.5	Soil	136.40
MA-2198Z	TP101	1.5	Soil	548.00
MA-2198AA	TP101	2.5	Soil	316.00
MA-2198AB	TP102	0.5	Soil	130.00
MA-2198AC	TP102	1.5	Soil	498.00
MA-2198AD	TP102	2.5	Soil	669.00
MA-2198AE	TP103	0.5	Soil	56.90
MA-2198AF	TP103	1.5	Soil	510.00
MA-2198AG	TP104	0.5	Soil	34.60
MA-2198AH	TP104	1.5	Soil	304.00
MA-2198AI	TP104	2.5	Soil	614.00
MA-2198AJ	TP105	0.5	Soil	65.60
MA-2198AK	TP105	1.5	Soil	104.90
MA-2198AL	TP105	2.5	Soil	97.40
MA-2198AM	TP106	0.5	Soil	79.40
MA-2198AN	TP106	1.5	Soil	772.00
MA-2198AO	TP106	2.5	Soil	387.00
MA-2198AP	TP107	0.5	Soil	80.70
MA-2198AQ	TP107	1.5	Soil	629.00
MA-2198AR	TP107	2.5	Soil	407.00
MA-2198AS	TP108	0.5	Soil	123.90
MA-2198AT	TP108	1.5	Soil	123.20
MA-2198AU	TP108	2.5	Soil	267.00
MA-2198AV	TP109	0.5	Soil	1084.00
MA-2198AW	TP109	1.5	Soil	823.00
MA-2198AX	TP109	2.5	Soil	679.00
MA-2198AY	TP110	0.5	Soil	270.00
MA-2198AZ	TP110	1.5	Soil	488.00
MA-2198BA	TP110	2.5	Soil	565.00
MA-2198BB	TP111	0.5	Soil	27.50
MA-2198BC	TP111	1.5	Soil	384.00
MA-2198BD	TP111	2.5	Soil	813.00
MA-2198BE	TP112	0.5	Soil	290.00
MA-2198BF	TP112	1.5	Soil	413.00
MA-2198BG	TP112	2.5	Soil	643.00

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-2198BH	TP113	0.5	Soil	102.20
MA-2198BI	TP113	1.5	Soil	745.00
MA-2198BJ	TP113	2.5	Soil	651.00
MA-2198BK	TP114	0.5	Soil	33.80
MA-2198BL	TP115	0.5	Soil	62.90
MA-2198BM	TP115	1.5	Soil	454.00
MA-2198BN	TP115	2.5	Soil	391.00
MA-2198BO	TP116	0.5	Soil	23.80
MA-2198BP	TP116	1.5	Soil	131.80
MA-2198BQ	TP116	2.5	Soil	101.20
MA-2198BR	TP117	0.5	Soil	64.30
MA-2198BS	TP117	1.5	Soil	243.00
MA-2198BT	TP117	2.5	Soil	245.00
MA-2198BU	TP118	0.5	Soil	153.60
MA-2198BV	TP118	1.5	Soil	327.00
MA-2198BW	TP118	2.5	Soil	360.00
MA-2198BX	TP119	0.5	Soil	87.60
MA-2198BY	TP119	1.5	Soil	267.00

Material Test Report

Report Number: 92225.02-1
Issue Number: 1
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Client: Cyan Stone Bringelly (Aus) Pty Ltd
Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 03/03/2020

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Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Determination of pH of Soil (In-House) DP MAC1

Sample Number	Location	Depth (m)	Material	pH Value
MA-2198Y	TP101	0.5	Soil	7.5
MA-2198Z	TP101	1.5	Soil	6.8
MA-2198AA	TP101	2.5	Soil	6.9
MA-2198AB	TP102	0.5	Soil	7.2
MA-2198AC	TP102	1.5	Soil	6.5
MA-2198AD	TP102	2.5	Soil	6.3
MA-2198AE	TP103	0.5	Soil	7.3
MA-2198AF	TP103	1.5	Soil	6.3
MA-2198AG	TP104	0.5	Soil	7.4
MA-2198AH	TP104	1.5	Soil	6.4
MA-2198AI	TP104	2.5	Soil	5.8
MA-2198AJ	TP105	0.5	Soil	6.9
MA-2198AK	TP105	1.5	Soil	6.6
MA-2198AL	TP105	2.5	Soil	6.6
MA-2198AM	TP106	0.5	Soil	6.7
MA-2198AN	TP106	1.5	Soil	7.1
MA-2198AO	TP106	2.5	Soil	7.3
MA-2198AP	TP107	0.5	Soil	7.6
MA-2198AQ	TP107	1.5	Soil	6.6
MA-2198AR	TP107	2.5	Soil	6.8
MA-2198AS	TP108	0.5	Soil	7.1
MA-2198AT	TP108	1.5	Soil	7.1
MA-2198AU	TP108	2.5	Soil	6.7
MA-2198AV	TP109	0.5	Soil	5.8
MA-2198AW	TP109	1.5	Soil	6.0
MA-2198AX	TP109	2.5	Soil	6.1
MA-2198AY	TP110	0.5	Soil	6.5
MA-2198AZ	TP110	1.5	Soil	6.2
MA-2198BA	TP110	2.5	Soil	6.1
MA-2198BB	TP111	0.5	Soil	7.4
MA-2198BC	TP111	1.5	Soil	6.9
MA-2198BD	TP111	2.5	Soil	6.6
MA-2198BE	TP112	0.5	Soil	7.0
MA-2198BF	TP112	1.5	Soil	6.7
MA-2198BG	TP112	2.5	Soil	6.6

Sample Number	Location	Depth (m)	Material	pH Value
MA-2198BH	TP113	0.5	Soil	7.3
MA-2198BI	TP113	1.5	Soil	6.4
MA-2198BJ	TP113	2.5	Soil	6.4
MA-2198BK	TP114	0.5	Soil	7.8
MA-2198BL	TP115	0.5	Soil	7.4
MA-2198BM	TP115	1.5	Soil	6.4
MA-2198BN	TP115	2.5	Soil	6.4
MA-2198BO	TP116	0.5	Soil	7.7
MA-2198BP	TP116	1.5	Soil	6.9
MA-2198BQ	TP116	2.5	Soil	7.1
MA-2198BR	TP117	0.5	Soil	7.2
MA-2198BS	TP117	1.5	Soil	6.6
MA-2198BT	TP117	2.5	Soil	6.7
MA-2198BU	TP118	0.5	Soil	6.9
MA-2198BV	TP118	1.5	Soil	6.9
MA-2198BW	TP118	2.5	Soil	6.8
MA-2198BX	TP119	0.5	Soil	7.3
MA-2198BY	TP119	1.5	Soil	6.7

Material Test Report

Report Number: 92225.02-1
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Date Issued: 11/03/2020
Client: Cyan Stone Bringelly (Aus) Pty Ltd
Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 28/02/2020

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Moisture Content AS 1289 2.1.1			
Sample Number	Sample Location	Moisture Content (%)	Material
MA-2198D	TP103 (1.5m)	7.4 %	SANDSTONE- fine grained, grey
MA-2198H	TP107 (0.5m)	16.2 %	Silty CLAY : red brown and grey mottled silty clay
MA-2198K	TP110 (1.5m)	17.7 %	Silty CLAY: pale gre silty clay
MA-2198P	TP115 (1.5m)	11.6 %	Silty CLAY : brown and grey
MA-2198R	TP108 (0.5 - 0.9m)	9.7 %	FILL/Silty CLAY
MA-2198T	TP117 (0.5 - 0.9m)	15.7 %	Silty CLAY : orange brown silty clay

Material Test Report

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Report Number: **92225.02-1**
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Level 16, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.02
Project Name: Proposed Rezoning
Project Location: 621 - 705 The Northern Road, Cobbitty
Work Request: 2198
Date Sampled: 05/02/2020
Dates Tested: 28/02/2020 - 28/02/2020

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	MA-2198Q	MA-2198S			
Date Sampled	05/02/2020	05/02/2020			
Date Tested	28/02/2020	28/02/2020			
Material Source	**	**			
Sample Location	TP101 (0.5 - 0.9m)	TP112 (0.5 - 0.9m)			
Inert Material Estimate (%)	1	0.5			
Pocket Penetrometer before (kPa)	600	600			
Pocket Penetrometer after (kPa)	270	300			
Shrinkage Moisture Content (%)	12.0	13.4			
Shrinkage (%)	**1.3**	**1.8**			
Swell Moisture Content Before (%)	12.2	13.3			
Swell Moisture Content After (%)	21.4	20.7			
Swell (%)	**7.3**	**7.2**			
Shrink Swell Index Iss (%)	**2.7**	**3.0**			
Visual Description	Silty CLAY:grey, brown, yellow and red mottled silty clay	**			
Cracking	SC	MC			
Crumbling	No	**			
Remarks	**	**			

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 311459

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	Bradley Harris
Address	18 Waler Crescent, Smeaton Grange, NSW, 2567

Sample Details

Your Reference	**92225.05, Salinity In & Management Plan**
Number of Samples	10 Soil
Date samples received	23/11/2022
Date completed instructions received	23/11/2022

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	30/11/2022
Date of Issue	30/11/2022

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Results Approved By
Diego Bigolin, Inorganics Supervisor
Giovanni Agosti, Group Technical Manager

Authorised By

Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		311459-1	311459-2	311459-3	311459-4	311459-5
Your Reference	UNITS	315/0.5	315/1.5	315/2.5	317/1.0	317/2.0
Date Sampled		16/11/2022	16/11/2022	16/11/2022	17/11/2022	17/11/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022
Date analysed	-	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022
Chloride, Cl 1:5 soil:water	mg/kg	20	840	760	360	550
Sulphate, SO4 1:5 soil:water	mg/kg	130	100	110	120	72

Misc Inorg - Soil						
Our Reference		311459-6	311459-7	311459-8	311459-9	311459-10
Your Reference	UNITS	320/1.0	320/2.0	322/0.5	322/1.5	322/2.5
Date Sampled		16/11/2022	16/11/2022	16/11/2022	16/11/2022	16/11/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022
Date analysed	-	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022
Chloride, Cl 1:5 soil:water	mg/kg	1,100	470	390	590	740
Sulphate, SO4 1:5 soil:water	mg/kg	280	82	280	220	230

ESP/CEC						
Our Reference		311459-1	311459-4	311459-7	311459-8	311459-9
Your Reference	UNITS	315/0.5	317/1.0	320/2.0	322/0.5	322/1.5
Date Sampled		16/11/2022	17/11/2022	16/11/2022	16/11/2022	16/11/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/11/2022	30/11/2022	30/11/2022	30/11/2022	30/11/2022
Date analysed	-	30/11/2022	30/11/2022	30/11/2022	30/11/2022	30/11/2022
Exchangeable Ca	meq/100g	2.1	0.8	0.6	2.6	0.9
Exchangeable K	meq/100g	0.3	0.1	0.2	0.2	0.2
Exchangeable Mg	meq/100g	8.9	5.1	7.6	8.6	8.2
Exchangeable Na	meq/100g	1.3	2.3	2.6	2.0	2.6
Cation Exchange Capacity	meq/100g	13	8.3	11	13	12
ESP	%	10	27	24	15	22

Method ID	Methodology Summary
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			29/11/2022	10	29/11/2022	29/11/2022		29/11/2022	[NT]
Date analysed	-			29/11/2022	10	29/11/2022	29/11/2022		29/11/2022	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	10	740	750	1	93	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	10	230	240	4	91	[NT]

QUALITY CONTROL: ESP/CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			30/11/2022	[NT]	[NT]	[NT]	[NT]	30/11/2022	[NT]
Date analysed	-			30/11/2022	[NT]	[NT]	[NT]	[NT]	30/11/2022	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	115	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY

Project Name:	Salinity Investigation and Management Plan			**To:**	Envirolab Services
Project No:	92225.05	**Sampler:**	DN		12 Ashley Street, Chatswood NSW 2067
Project Mgr:	BAH	**Mob. Phone:**	0412 754 162	**Attn:**	Tania Notaras
Email:	Bradley.Harris@douglaspartners.com.au			**Phone:**	(02) 9910 6200 **Fax:** (02) 9910 6201
Date Required:	Standard			**Email:**	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Sampling Date	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes									Notes/preservation
							Chlorides Sulphates	Sodicity						
315/0.5	1	16/11/22	S	G			x	x						
315/1.5	2	16/11/22	S	G			x							
315/2.5	3	16/11/22	S	G			x							
317/1.0	4	17/11/22	S	G			x	x						
317/2.0	5	17/11/22	S	G			x							
320/1.0	6	16/11/22	S	G			x							
320/2.0	7	16/11/22	S	G			x	x						
322/0.5	8	16/11/22	S	G			x	x						
322/1.5	9	16/11/22	S	G			x	x						
322/2.5	10	16/11/22	S	G			x							

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 311457
Date Received: 23/11/2022
Time Received: 1500
Received By:
Temp: Cool/Ambient
Cooling: Ice/Icepack 14°C
Security: Intact/Broken/None

Lab Report No:			
Send Results to:	Douglas Partners Pty Ltd	**Address** 18 Waler Crescent, Smeaton Grange 2567	**Phone:** (02) 4647 0075 **Fax:** (02) 4646 1886
Relinquished by:	BAH	**Transported to laboratory by:**	
Signed [redacted]	**Date & Time:** 22/11/2022	**Received by:** Tanya Doherty	23/11/2022

Material Test Report

Report Number: 92225.05-1
Issue Number: 2 - *This version supersedes all previous issues*
Reissue Reason: *Changed depth of a sample*
Date Issued: 07/12/2022
Client: Boyuan Bringelly Pty Ltd
Level 6, 5 Martin Place, SYDNEY NSW 2000
Contact: Adam Carmody
Project Number: 92225.05
Project Name: Proposed Residential Subdivision
Project Location: Lot 500, Oxley Ridge Estate, SWP, Cobbitty NSW
Work Request: 9201
Dates Tested: 30/11/2022 - 05/12/2022
Location: pH, EC & Texture

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

[redacted]

Approved Signatory: Nilusha Arachchi
clean lab
Laboratory Accreditation Number: 828

Determination of pH of Soil (In-House) DP MAC1

Sample Number	Location	Depth (m)	Material	pH Value
MA-9201A	314	0.5	Soil	8.2
MA-9201B	314	1.0	Soil	8.4
MA-9201C	314	1.5	Soil	5.2
MA-9201D	314	2.0	Soil	4.9
MA-9201E	314	2.5	Soil	4.9
MA-9201F	315	0.5	Soil	5.9
MA-9201G	315	1.0	Soil	5.3
MA-9201H	315	1.5	Soil	4.9
MA-9201I	315	2.0	Soil	4.8
MA-9201J	315	2.5	Soil	5.3
MA-9201K	315	3.0	Soil	5.2
MA-9201L	316	0.5	Soil	6.0
MA-9201M	316	1.0	Soil	6.0
MA-9201N	316	1.5	Soil	5.5
MA-9201O	316	2.0	Soil	7.1
MA-9201P	316	2.5	Soil	5.5
MA-9201Q	316	3.0	Soil	5.4
MA-9201R	317	0.5	Soil	6.7
MA-9201S	317	1.0	Soil	6.4
MA-9201T	317	1.5	Soil	7.4
MA-9201U	317	2.0	Soil	8.0
MA-9201V	317	2.5	Soil	8.2
MA-9201W	317	3.0	Soil	8.4
MA-9201X	318	0.5	Soil	5.8
MA-9201Y	318	1.0	Soil	5.1
MA-9201Z	318	1.5	Soil	4.9
MA-9201AA	318	2.0	Soil	5.0
MA-9201AB	318	2.5	Soil	5.0
MA-9201AC	318	3.0	Soil	5.2
MA-9201AD	319	0.5	Soil	5.7
MA-9201AE	319	1.0	Soil	7.2
MA-9201AF	319	1.5	Soil	7.4

Sample Number	Location	Depth (m)	Material	pH Value
MA-9201AG	319	2.0	Soil	7.7
MA-9201AH	319	2.5	Soil	7.7
MA-9201AI	319	2.9	Soil	7.7
MA-9201AJ	320	0.5	Soil	6.0
MA-9201AK	320	1.0	Soil	4.5
MA-9201AL	320	1.5	Soil	4.8
MA-9201AM	320	2.0	Soil	4.8
MA-9201AN	320	2.5	Soil	4.8
MA-9201AO	320	3.0	Soil	5.0
MA-9201AP	321	0.5	Soil	6.0
MA-9201AQ	321	1.0	Soil	5.0
MA-9201AR	321	1.5	Soil	5.2
MA-9201AS	322	2.0	Soil	5.6
MA-9201AT	322	0.5	Soil	5.4
MA-9201AU	322	1.0	Soil	5.3
MA-9201AV	322	1.5	Soil	4.9
MA-9201AW	322	2.0	Soil	4.8
MA-9201AX	322	2.5	Soil	4.9
MA-9201AY	322	3.0	Soil	4.8
MA-9201AZ	323	0.5	Soil	5.7
MA-9201BA	323	1.0	Soil	5.7
MA-9201BB	323	1.5	Soil	6.7
MA-9201BC	323	2.0	Soil	7.4
MA-9201BD	323	2.5	Soil	7.5
MA-9201BE	323	3.0	Soil	7.6

Material Test Report

Report Number:	**92225.05-1**
Issue Number:	2 - *This version supersedes all previous issues*
Reissue Reason:	*Changed depth of a sample*
Date Issued:	07/12/2022
Client:	Boyuan Bringelly Pty Ltd
	Level 6, 5 Martin Place, SYDNEY NSW 2000
Contact:	Adam Carmody
Project Number:	92225.05
Project Name:	Proposed Residential Subdivision
Project Location:	Lot 500, Oxley Ridge Estate, SWP, Cobbitty NSW
Work Request:	9201
Dates Tested:	30/11/2022 - 05/12/2022
Location:	pH, EC & Texture

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

[redacted]

Approved Signatory: Nilusha Arachchi
clean lab
Laboratory Accreditation Number: 828

Determination of EC of Soil (In-House) DP MAC2

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-9201A	314	0.5	Soil	39.20
MA-9201B	314	1.0	Soil	121.10
MA-9201C	314	1.5	Soil	653.70
MA-9201D	314	2.0	Soil	947.40
MA-9201E	314	2.5	Soil	940.90
MA-9201F	315	0.5	Soil	80.70
MA-9201G	315	1.0	Soil	392.60
MA-9201H	315	1.5	Soil	681.90
MA-9201I	315	2.0	Soil	725.10
MA-9201J	315	2.5	Soil	569.20
MA-9201K	315	3.0	Soil	493.60
MA-9201L	316	0.5	Soil	42.30
MA-9201M	316	1.0	Soil	502.30
MA-9201N	316	1.5	Soil	523.70
MA-9201O	316	2.0	Soil	587.40
MA-9201P	316	2.5	Soil	652.80
MA-9201Q	316	3.0	Soil	689.60
MA-9201R	317	0.5	Soil	54.60
MA-9201S	317	1.0	Soil	363.40
MA-9201T	317	1.5	Soil	528.80
MA-9201U	317	2.0	Soil	554.60
MA-9201V	317	2.5	Soil	477.50
MA-9201W	317	3.0	Soil	337.90
MA-9201X	318	0.5	Soil	66.20
MA-9201Y	318	1.0	Soil	300.30
MA-9201Z	318	1.5	Soil	464.90
MA-9201AA	318	2.0	Soil	424.00
MA-9201AB	318	2.5	Soil	387.60
MA-9201AC	318	3.0	Soil	412.20
MA-9201AD	319	0.5	Soil	328.60
MA-9201AE	319	1.0	Soil	602.10
MA-9201AF	319	1.5	Soil	883.00

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-9201AG	319	2.0	Soil	834.70
MA-9201AH	319	2.5	Soil	876.90
MA-9201AI	319	2.9	Soil	639.10
MA-9201AJ	320	0.5	Soil	100.50
MA-9201AK	320	1.0	Soil	964.70
MA-9201AL	320	1.5	Soil	955.90
MA-9201AM	320	2.0	Soil	820.10
MA-9201AN	320	2.5	Soil	832.60
MA-9201AO	320	3.0	Soil	767.60
MA-9201AP	321	0.5	Soil	59.70
MA-9201AQ	321	1.0	Soil	644.90
MA-9201AR	321	1.5	Soil	623.50
MA-9201AS	322	2.0	Soil	323.10
MA-9201AT	322	0.5	Soil	3516.00
MA-9201AU	322	1.0	Soil	604.60
MA-9201AV	322	1.5	Soil	602.20
MA-9201AW	322	2.0	Soil	706.30
MA-9201AX	322	2.5	Soil	617.60
MA-9201AY	322	3.0	Soil	753.10
MA-9201AZ	323	0.5	Soil	267.60
MA-9201BA	323	1.0	Soil	608.70
MA-9201BB	323	1.5	Soil	693.40
MA-9201BC	323	2.0	Soil	539.90
MA-9201BD	323	2.5	Soil	512.70
MA-9201BE	323	3.0	Soil	490.60